

Transactional Processes of Parent-Child Interactions from Early to Middle Childhood

by

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ABSTRACT

Theoretical models support conceptualizing parent-child relationships as reciprocal and transactional with each person exerting influence on the other's behaviors and the overall quality and valence of the relationship across time. The goals of this study were twofold: 1) determine whether there were reciprocal relations in maternal hostility and child negativity across early and middle childhood, and 2) investigate whether individual characteristics (i.e., child temperamental anger and frustration and maternal neuroticism) moderated relations found in goal one. Data were from the Study of Early Child Care and Youth Development. Empirical support was found for conceptualizing mother-child interactions as reciprocal. Maternal hostility was related to a decrease in the probability children would exhibit negative behaviors during mother-child interactions measured approximately two years later. Child negativity was also associated with a significant decrease in the probability mothers would display future hostility.

Child temperamental anger and frustration was found to moderate reciprocal relations across all three parent-to-child cross-lagged paths. Children scoring high on a dispositional proclivity to react with anger and frustration were more likely to avoid maternal hostility, via a significant decrease in negativity, across time. Moderation was also supported in two of three child-to-parent lagged paths. Finally, maternal neuroticism moderated the reciprocal effects during early childhood, such that more neurotic mothers were more likely to demonstrate a decrease in the probability of hostility relative to mothers scoring lower on neuroticism. This affect was attenuated in middle childhood, with patterns becoming similar between mothers scoring high and low on neuroticism. Moreover, children of less neurotic mothers were more likely to demonstrate a decrease

in the probability of exhibiting negativity from 36 to 54 months compared to children of more neurotic mothers. This effect also attenuated with patterns becoming negative at the grade 1 to grade 3 lag. Overall, the results from this study supported a transactional model of parent-child relationships, were consistent with the motivation literature, did not support a coercive process of interaction when the sample and measurement paradigm were low-risk, and generally suggested parents and children have an equal influence on the relational processes investigated from early to middle childhood.

DEDICATION

With overflowing and abundant love, I gratefully dedicate this work to my husband, Krzysztof, and my children, Jake and Stacey. Your love, patience, and plentiful kisses helped Mommy realize her dreams. Without you three I wouldn't be here. Jake and Stacey, this dissertation demonstrates the power of prayer. Thank you for all the prayer circles you prayed with Daddy. Krzysztof, this dissertation is demonstration of your love for me and empirical evidence of what it looks like to deny yourself daily.

To God be the glory.

Philippians 4:13

Jeremiah 29:11

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
CHAPTER	
1 INTRODUCTION.....	1
Parenting: Influences on Children’s Behaviors.....	4
Parenting: A Product of Children’s Characteristics and Behaviors.....	11
Bidirectional and Reciprocal Models of Parent and Child Behavior.....	14
Child Temperament.....	16
Maternal Neuroticism.....	20
Present Study.....	24
2 METHOD.....	29
Participants.....	29
Procedures and Measures.....	30
Mother-Child Observation.....	30
Observational Ratings.....	32
Temperamental Anger and Frustration.....	34
Maternal Neuroticism.....	34
Data Analytic Plan.....	36
3 RESULTS.....	40
Descriptive Statistics.....	40
Hybrid Cross-Lagged Panel Model.....	41

CHAPTER	Page
Moderation by Temperamental Anger and Frustration.....	47
Moderation by Maternal Neuroticism.....	52
4 DISCUSSION.....	56
Sample and Measurement Considerations.....	57
Reciprocal Mother-Child Relations Across Early to Middle Childhood...	58
Mother-to-Child Effects.....	61
Child-to-Mother Effects.....	64
Patterns of Association across Development.....	65
Stability in Behaviors across Development.....	67
The Moderating Role of Individual Characteristics.....	67
Child Temperamental Anger and Frustration.....	68
Maternal Neuroticism.....	74
Limitations and Future Directions.....	78
5 CONCLUSION.....	84
REFERENCES.....	98
APPENDIX	
A MODEL FIT COMPARISON TESTS.....	116

LIST OF TABLES

Table	Page
1. Descriptive Statistics.....	87
2. Bivariate Correlations for Study Variables.....	88
3. Bivariate Correlations for Maternal Hostility and Child Negativity by Temperamental Anger and Frustration.....	89
4. Bivariate Correlations for Maternal Hostility and Child Negativity by Neuroticism....	90
5. Path Comparison Tests for Moderation by Temperamental Anger and Frustration.....	91
6. Path Comparison Tests for Moderation by Neuroticism.....	92

LIST OF FIGURES

Figure	Page
1. Conceptual Hybrid Cross-Lagged Panel Model.....	93
2. Autoregressive Model.....	94
3. Hybrid Cross-Lagged Panel Model.....	95
4. Hybrid Cross-Lagged Panel Model with Moderation by Temperamental Anger and Frustration.....	96
5. Hybrid Cross-Lagged Panel Model with Moderation by Neuroticism.....	97

Transactional Processes of Parent-child Interactions from Early to Middle Childhood

The extant literature and theory on parenting and children's development provides strong evidence for conceptualizing parent-child relationships as reciprocal and transactional (Bell, 1968; Belsky, 1984; Bronfenbrenner & Evans, 2000; Sameroff, 2009; Sameroff & Chandler, 1975). Examining bidirectional and reciprocal relations allows researchers to more fully understand conditional processes and offer more nuanced hypotheses as regards theory and advancements in empirical research (Bronfenbrenner & Evans, 2000; Kiff, Lengua, & Zalewski, 2011). Although bidirectional and reciprocal models have increasingly been hypothesized and estimated in developmental research, many of these models have examined parenting in one context and children's developmental outcomes in another (i.e., maternal hostility and children's externalizing behaviors), resulting in a dearth of knowledge regarding the intricate links through which processes of parent and child behaviors occur in-context and lead to an overall quality of the parent-child relationship.

Implicit in studies of parenting and parent-child relationships is the assumption that, overtime, moment-to-moment parent-child interactions create a relational environment, which sets the stage for nurturing or impeding optimal child development. Consider, for example, the vast literature on the effects of parental hostility on children's development and the parent-child relationship. Theoretical arguments (e.g., Deci & Ryan, 2012; Patterson, 1982), and decades of empirical research, generally support that hostile parenting impedes healthy child development (for relevant reviews, see Hoeve et al., 2009; Rubin & Burgess, 2002), and that children's antisocial, aggressive behaviors elicit harsh parenting (Caspi & Moffitt, 1995; Dumas & Wekerle, 1995; Ge et al., 1996;

Lytton, 1990; Patterson, 1982). These correlational studies do not make clear the process through which this coercive pattern develops. Although there is some evidence the relation between maternal hostility and children's problem behaviors may be reciprocal in nature (e.g., Pardini et al., 2008; Pearl et al., 2014), these studies have also approached reciprocal models by examining parent and child behaviors in separate contexts. Like correlational studies, these reciprocal studies relied on the assumption that parents' and children's behaviors result from their shared experiences in interactions with one another. Although the assumption that negative parent-child interactions lead to both negative parent and child outcomes may be intuitive, few researchers have endeavored to test this relation between moment-to-moment parent-child behaviors (e.g., maternal hostility and child negativity) and those same behaviors at a later point in development, in order to more fully grasp the processes through which the parent-child relationship is established. This is particularly true when considering research beyond infancy and very early childhood.

Comprehending the processes through which parent-child interactions in-the-moment influence the overall valence and quality of the parent-child relationship is critically important, as psychologists and developmental scientists frequently rely on the implicit assumption that these moment-to-moment parent-child interactions form the relations between parenting practices and child development. Therefore, the first aim of the current investigation was to examine the bidirectional, reciprocal relation between maternal hostility and child negativity as these behaviors occurred in-the-moment during parent-child interactions measured across early and middle childhood. Specifically, this study investigated whether maternal hostility and child negativity measured in-the-

moment predicted mothers' and children's future behaviors (i.e., reciprocal effects) controlling for both individuals' previous behaviors (i.e., autoregressive or stability effects) and the moment-to-moment behaviors exhibited by both partners (i.e., synchronous effects). Importantly, the synchronous effects will be estimated in the cross-lagged models in order to control for parents' and children's shared experiences during interactions and therefore allow for more specific conclusions regarding the formation of the parent-child relationship over time (i.e., clearer interpretation of the cross-lagged effects and patterns of association across time). However, the synchronous paths were not a central focus of the current investigation due to difficulty in correctly interpreting these effects and the data were not transactionally coded.

Individual characteristics of parents and children are important considerations for comprehending how parents' and children's biological and behavioral characteristics affect each other's behaviors, and consequently children's development (Belsky, 1984; Bronfenbrenner & Morris, 2006). Therefore, in addition to establishing whether reciprocal relations between maternal hostility and child negativity exist across early and middle childhood, the second aim of this study was to more fully comprehend for whom reciprocal patterns may be most salient. First, temperamental difficulty has been related to children's later behavioral problems (e.g., Blair, 2002; Eisenberg et al., 1996; Guerin et al., 1997), and the susceptibility towards negative developmental outcomes when childrearing environments are not supportive and harsh (e.g., Belsky, Hsieh, & Crnic, 1998; Pluess & Belsky, 2009). Therefore, temperamental anger and frustration, reflecting the child's dispositional proclivity to express anger and frustration, was assessed as a moderator of the transactional relations between maternal hostility and child negativity

across time from assessment to assessment (i.e., moderation of the reciprocal effect). Second, in consideration of maternal characteristics, neuroticism (a facet of personality) has been empirically related to incompetent parenting (e.g., Belsky & Barends, 2002; Bornstein, Hahn, & Hayes, 2011; Conger et al., 1984; Kochanska, Clark, & Goldman, 1997), and the proclivity to respond more negatively to conflict and negative affect (Gottman et al., 1998). Consequently, neuroticism was investigated as a moderator of the child-to-parent effect of negativity on hostility through time (i.e., moderation of the reciprocal effect). Child temperamental anger and frustration, and maternal neuroticism were considered in separate models to determine whether these relatively enduring individual characteristics make it more likely that mothers and children will develop a differential pattern of interaction across early to middle childhood thereby advancing theoretical and empirical research, and clinical practice.

Parenting: Influences on Children's Behavior

Patterson's (1976, 1982) coercion theory contends that parents and children engage in higher levels of aversive behaviors, in an attempt to control each other's behavior, until one partner capitulates thereby negatively reinforcing the other's negative behavior. Overtime, coercive patterns of interaction lead to more hostile parenting and more antisocial, noncompliant behaviors in children. Hostile parenting, characterized by anger, rejection, blame, insults, hurtful physical touch, or shouts (Bradley, Pennar, & Iida, 2015; Chang, Schwartz, Dodge, & McBride-Chang, 2003; Lansford et al., 2010; Schwartz, Dodge, Pettit, & Bates, 1997), has consistently been linked to children's poor developmental outcomes (e.g., Hoeve et al., 2009; Rubin & Burgess, 2002). Coercive parent-child interactions have been hypothesized to contribute to socializing children to

be negative and uncooperative, and ultimately lead children to engage in externalizing and delinquent behaviors (Gershoff, 2002; Granic & Patterson, 2006; Hoeve et al., 2009; Patterson, Reid, & Dishion, 1992).

Socialization refers to the process whereby novel individuals (i.e., children) gain a set of behaviors and skills necessary for optimal engagement and functioning in their environment from more knowledgeable others (e.g., parents; Maccoby, 2007). Although socialization is a life-long process, and there are many sources of socialization across the life-span (e.g., parents, peers, teachers), the first years of life are arguably when the deepest socialization occurs, and during which time parents serve as primary socializing agents for young children (Grusec, 2002; Maccoby, 2007). Through parents' socialization efforts, children are believed to internalize a set of behavioral habits and views of interpreting social interactions (Kuczynski & Grusec, 1997; Grusec, 2002). In turn, these learned behaviors and understandings shape children's social and emotional skills.

Self-determination theory (SDT) posits humans have three inherent psychological needs: autonomy, relatedness and competence, and social-contextual exchanges either nurture or impede individuals' development and well-being (Deci & Ryan, 2012; Ryan & Deci, 2000). To the extent that social and environmental conditions support these basic psychological needs, optimal development can occur. During infancy children are highly dependent on parents to fulfill all of their needs. Overtime, children become increasingly autonomous but also maintain a need to feel accepted by their parents (e.g., related). Harsh parenting behaviors directed towards children likely represent a social environment that undermines children's needs of autonomy, acceptance and relatedness (Ryan & Deci, 2000), and in turn, children likely react with negative behaviors directed towards their

parents (Rohner, Khaleque, & Cournoyer, 2012). The attachment literature generally supports this argument such that unsupportive or inconsistently supportive parenting early-on sets the stage for later dysfunction in the parent-child relationship and children's optimal development (Ainsworth, 1989; Ainsworth & Bowlby, 1991). Early harsh parenting likely socializes children to behave in negative ways by undermining children's needs for autonomy, acceptance and relatedness, and leads to negative attributional biases. In this regard, early hostility in the parent-child relationship likely has a strong effect on children's concurrent and future use of negative behaviors.

Parents' socialization efforts may be more influential during infancy and early childhood when children spend more time with parents (Collins, Madsen, & Susman-Stillman, 2002; Kuczynski & Grusec, 1997), children's temperaments are more susceptible to environmental influences (Rothbart, 2012), and children learn to regulate their emotions, cognitions and behaviors (Grusec, 2002; Rothbart, 2012). Well-functioning families often provide the skills, understandings and behaviors needed to develop social competence; however, other families socialize children to be incompetent and antisocial (Maccoby, 2007). Exposure to parental hostility, particularly during infancy and early childhood, may socialize children to form hostile attributional biases and engage in angry styles of interaction (Carrasco et al., 2009; Dodge, 1991). In accord with social learning theory (Bandura, 1973, 1977), parents' modeling of hostile behaviors may unintentionally socialize children to engage in, and expect from others, negative styles of interpersonal interaction; thus developing a learned coercive pattern of interpersonal interaction.

Parents' developmental expectations, or beliefs regarding the age at which children learn particular skills and behaviors (Goodnow, Cashmore, Cotton, & Knight, 1984), and perceptions of children's behaviors are believed to shape parenting practices (Harkness, Super, & Mavridis, 2011) and the process through which parents socialize their children (Darling & Steinberg, 1993). For example, Fox and colleagues (1995) investigated more than 1,000 mothers with children under the age of 5, and reported mothers' higher developmental expectations were correlated with mothers' reports of engaging in harsher disciplinary practices (e.g., yelling, spanking). Parents' perceptions and beliefs regarding children's behaviors change across development (McNally, Eisenberg, & Harris, 1991; Mills & Rubin, 1992). During infancy, parents are more likely to view positive child behaviors as dispositional (e.g., personality) whereas they are more likely to view negative behaviors as a response to situational conditions (e.g., tired, hungry; Bugental & Happaney, 2002). As children age, parents are more likely to view negative behaviors as intentional and thus believe children are more responsible for their behaviors (Dix, Ruble, Grusec, & Nixon, 1986). The more intentional parents believe their children's behaviors are, the more likely they are to respond negatively when children exhibit these behaviors (Dix et al., 1986; Dix et al., 1989). As a result, parents have been shown to endorse harsher parenting strategies in response to children's hostility across early childhood compared to infancy (Dix, 1991; Dix et al., 1989; Rubin & Burgess, 2002). Moreover, children perceived as problematic (e.g., frequent challenging behaviors) are more likely to espouse anger from their parents and in turn view their parents as unsupportive. In contrast, children perceived as normal are more likely to be met with adaptive, solution-oriented parenting strategies and in response

children are likely to view parents as supportive (Bugental & Happaney, 2002). In this manner, parents' perceptions of their child, and their behavior, influence the socialization process with children viewed as problematic more likely to learn incompetent social strategies, and children viewed as not problematic more apt to learn socially adaptive behaviors (Rubin & Burgess, 2002). Together this research suggests that maternal expectations for children's behaviors likely shape their engagement in parenting practices and ultimately the socialization of their children via engagement in negative parenting practices and modeling of negative methods of interpersonal interaction.

Relatively few investigations have considered the relation between maternal hostility and children's negative behaviors as both occur during parent-child interactions, that is, in the same paradigm of measurement (for exceptions, see Bradley et al., 2015; Ispa et al., 2008; Kertz, Smith, Chapman, & Woodruff-Borden; Szabo et al., 2008). Utilizing the same longitudinal data as the current investigation, Bradley and colleagues (2015) found mothers who exhibited more hostility during dyadic interactions had children who displayed more negativity. This relation decreased over time from early to middle childhood, suggesting that the link between harsh parenting and child negative behavior may attenuate across development. Using similar coding procedures as both Bradley et al. and the current investigation, Ispa and colleagues (2004) found maternal intrusiveness (e.g., controlling the interaction or grabbing toys) during mother-child interactions at 15-months, predicted children's negativity (e.g., anger or dislike) toward the mother during similar interaction tasks at 25-months among a sample of 1,232 toddler-mother dyads enrolled in Early Head Start. Finally, in a cross-sectional investigation of children in early to middle childhood, maternal sensitivity, a composite

of warmth, responsiveness and hostility, predicted children's negativity as observed during a series of dyadic interaction tasks (Kertz et al., 2008). These correlational studies provide support for conceptualizing children's behaviors as being shaped by parents' behaviors; however, it is also possible that children's behaviors were a determinant of the measured parent behaviors.

Given the dearth of research on maternal hostility and child negativity as they occur in-the-moment, insight regarding these associations might be gleaned from studies investigating parenting and child outcomes in separate contexts. Investigations examining the effects of parenting styles (e.g., authoritarian) and domains of parenting (e.g., hostility, negative control) have consistently demonstrated links between negative parenting behaviors (e.g., physical punishment, harsh vocalizations) and aggressive and antisocial child behaviors (e.g., Bates, Pettit, Dodge, & Ridge, 1998; Carrasco, Holgado, Rodriguez, & del Barrio, 2009; Dishion et al., 1994; Hart, DeWolf, & Burts, 1992; Kuczynski & Kochanska, 1995; Rose-Krasnor et al., 1996; Stormshak et al., 2000). Moreover, hostile parenting has consistently been related to children's externalizing behaviors (Carrasco et al., 2009; Denham et al., 2000; Harold, Elam, Lewis, Rice, & Thapar, 2012; Patterson & Dishion, 1988; Rothbaum & Weisz, 1994; Stocker et al., 2003).

In a meta-analysis examining the association between parenting and child delinquency, Loeber and Stouthamer-Loeber (1986) found parental rejection to be one of the most robust predictors of children's problem behavior. Similarly, in their meta-analysis of 161 studies, Hoeve and colleagues (2009) found parental support and control predicted youth delinquency; however, effect sizes were significantly larger for negative

parenting dimensions (e.g., hostility and rejection) relative to positive parenting dimensions (e.g., acceptance and warmth) in predictions of delinquent behavior. Moreover, the authors found relations between parenting and delinquency were stronger in middle childhood and early adolescence than during later adolescence.

This body of research elucidates a clear connection between poor parenting practices and children's problem behaviors; however, it is important to consider the function of hostility on children's development and the quality of the parent-child relationship. In particular, parents' socialization of children's behaviors and thoughts, and parents' expectations regarding children's behaviors are likely to be important for comprehending the process through which hostility affects children's behaviors. Grusec & Goodnow (1994) posited the success of socialization depended on children's ability to accurately interpret parents' messages, and children's acceptance of parents' behaviors as appropriate. Overtime as children engage in a variety of social relationships outside the home (e.g., peers, teachers), children of harsh parents may no longer accept parents' hostility as an acceptable response, resulting in a decreased effect of parental hostility on children's behaviors. That is, across middle childhood children may come to ignore parental hostility in such a way that it has less of an influence their behavior (e.g., no need to pay attention, it's just mom being mom). Moreover, in support of a decrease in the strength of the parent-to-child relation of hostility, children's increasing autonomy and less dependence on parents for daily care might also contribute to a decrease in the effect of parental hostility on children's behavior.

Parenting: A Product of Children's Characteristics and Behaviors

A vast theoretical and empirical literature have established the critical role parents play in children's development (see Bornstein, 2002 for a 5 volume handbook). It is also widely accepted that children's individual characteristics and proclivities shape parents' behaviors and moderate the effects of parenting behaviors on children's development (Bell, 1968; Lamb et al., 1982; Kiff, Lengua, & Zalewski, 2011; Maccoby, 1999; Russell, 1997). Commensurate with this notion, several theoretical arguments contend that children are not passive recipients of information and experiences, but rather play an integral role in interpreting and shaping those experiences (Belsky, 1984; Bronfenbrenner & Evans, 2000; Sameroff, 1975, 2009). In this regard, children are agents of their own socialization through the elicitation of specific behavioral responses from parents (Maccoby, 2007). For example, in response to children's difficult and problem behaviors, parents were more likely to engage in negative parenting behaviors (Caspi & Moffit, 1995; Dumas & Wekerle, 1995; Ge et al., 1996; Patterson, 1982; Patterson, Reid, & Dishion, 1992; Pettit et al., 2001).

Several researchers have argued that aggressive and externalizing behaviors are likely to elicit harsh and affectively negative responses from parents (e.g., Lytton, 1990; Rubin & Burgess, 2002). Challenging child behavior is likely difficult to manage and may require parents to regulate their own emotions in order to respond effectively (Lorber, O'Leary, & Kendziora, 2003). For example, Deater-Deckard and colleagues (2012) found children's conduct problems predicted harsh negativity from mothers, with relations stronger among mothers with poorer executive functioning. SDT provides theoretical support for the idea that children's challenging behaviors may undermine

mothers' needs for competence (Deci & Ryan, 2002), and sense of confidence and effectiveness in parenting (Patterson & Joseph, 2007). Moreover, lack of parenting competence may challenge mothers' sense of self-efficacy thereby further undermining future parenting efforts (Bandura, 1977), and increasing mothers' proclivities to respond to negative and noncompliant child behaviors in a hostile manner.

Rubin and Burgess (2002) suggested that across childhood, children's aggressive behaviors engender more maternal anger, and parents are more likely to use power-assertive strategies to gain control of children's behaviors. This supposition would suggest mothers' hostility in response to child negativity would increase over time as mothers' expectations and beliefs regarding children's social competence and the causes of their behavior (dispositional vs. situational) shift to reflect greater expectations of children's regulation and compliance. As children become more regulated and compliant, and less impulsive, they are less likely to elicit negative parental reactions; however, there is likely an interplay between parents' increasing expectations and children's gaining competencies such that when children do elicit behavior problems parents respond with more negativity. This may be particularly true for children perceived to be 'problematic' (Bugental & Happaney, 2002).

Cross-sectional and longitudinal examinations of the influences of children's behaviors on parenting, as well as antecedents of parenting behaviors, have consistently supported a direct relation between children's engagement in aggressive, antisocial behaviors and parents' utilization of harsh parenting strategies (e.g., Caspi & Moffitt, 1995; Dumas & Wekerle, 1995; Lytton, 1990; Patterson, 1982), regardless of children's age. In a longitudinal study of 440 mother-child dyads, mothers', but not children's,

reports of children's externalizing behaviors at age 5, predicted mothers' self-rated psychological control at age 13 (Pettit et al., 2001). Ge and colleagues' (1996) found children's hostile and antisocial behaviors predicted mothers' engagement in harsh, inconsistent parenting behaviors among a cross-sectional sample of 41 adopted children, aged 12-18, and their adoptive parents. Patterson (1986) found children's deviant behavior accounted for more than half the variance in maternal rejection. This research supports a child-effect of negativity on harsh parenting, but of course, it is also possible that mothers' harsh parenting precipitated children's hostility and problem behaviors.

Early childhood is marked by significant advances in children's development. Around 2-3 years children become more compliant to parents' requests, presumably because of shifts in self-regulation and effortful control (Eisenberg, 2012; Spinrad et al., 2007; Spinrad et al., 2012) and advances in their cognitive capacity to comprehend directives and respond appropriately (Patterson & Fisher, 2002). In a cross-cultural investigation of compliance, Whiting & Edwards (1988) found substantial differences in children's rates of compliance across toddlerhood and childhood. For example, 2 and 3 year olds were compliant 72% of the time, whereas by age 8 children were compliant 82% of the time. It seems logical that as children become more regulated and compliant to their parents' requests, they are less likely to evoke negative responses from their parents (e.g., Eisenberg, Eggum, Vaughan, & Edwards, 2010; Eisenberg et al., 2009; Kochanska & Knaack, 2003; Spinrad et al., 2007; Spinrad et al., 2012). However, Patterson and Fisher (2002) argued that children's development of compliance is likely facilitated by contingent, sensitive parenting. In this case, non-contingent, harsh parenting

likely undermines children's development of compliance and leads to continued harsh parenting (Shaw & Winslow, 1997).

Bidirectional and Reciprocal Models of Parent and Child Behavior

The extant literature provides evidence for both parent and child effects for the relation between harsh parenting and children's negative and problem behaviors; however, correlational studies, even those with longitudinal designs, do not make clear whether parents, children, or the interplay between parents and children drive the robust relations aforementioned. Bidirectional and reciprocal studies offer important information as regards the direction of effects because these models simultaneously account for both individuals' previous and current behaviors. Studies investigating the reciprocal effects of parenting and children's behavior in separate paradigms (i.e., not in-the-moment) demonstrate inconsistent evidence for both parent and child effects, and for the strength of relations over time. Several studies have found support for either parent or child effects, but only a few have provided evidence for both parent and child effects in the same model.

Pearl and colleagues (2014) found support for reciprocal effects of parenting quality and children's externalizing behavior problems across early and middle childhood; however, the parent-to-child effect increased over time, whereas the child-to-parent effect decreased over time. Both parent and child behavior evidenced within domain stability across time. In another study, Pardini and colleagues (2008) found reciprocal relations between parental physical punishment and teacher reported child conduct problems among a sample of boys followed from middle childhood to

adolescence. The magnitude of parent-to-child effects did not vary from child-to-parent effects; however, there was evidence that the strength of relations did vary overtime.

Despite some evidence of reciprocal relations, many studies have found evidence for either parent effects or child effects. In evidence of parent-to-child effects, Lansford et al. (2011) found consistent evidence for the effect of physical discipline on children's increasing antisocial behavior across two samples. In contrast, child-to-parent effects were less consistent with evidence supporting child effects in middle childhood, but not in adolescence, and only among the sample with all male children. Wu and colleagues (2014) found evidence to support parent, but not child effects, in a reciprocal assessment of maternal hostility and children's delinquency from middle childhood to late adolescence.

Rubin and Burgess (2002) asserted that children's negative, antisocial behaviors may have a greater effect on parents' use of harsh discipline, than the effect of harsh parenting on children's negative behaviors. Several studies utilizing reciprocal models provide evidence to support predominately child-to-parent effects. For example, Burke and colleagues (2008) found stronger evidence for child effects on parenting practices, than for parenting effects on child behaviors among a sample of clinically-referred boys followed from childhood through adolescence. Specifically, clinical symptoms of oppositional defiance disorder predicted lower levels of communication, involvement and supervision. Conduct disorder predicted harsher parenting, though affects were attenuated once ethnicity and SES were controlled. Only timid parenting predicted decrements in children's behavior. Shaffer and colleagues (2013) conducted a recent study examining a series of reciprocal models of child externalizing behavior and multiple domains of

parenting among a sample of mostly male, at-risk children followed from early to middle childhood. Stronger child-to-parent effects were evidenced with child externalizing behaviors predicting increases in both negative parenting and inconsistent discipline; whereas, corporal punishment was the only model demonstrating parent-to-child effects on externalizing behaviors. Stability was found for the within domain stability of parent and child behaviors (e.g., negative parenting predicting negative parenting across time). In another study, Fite et al. (2006) found support for child effects for the relation between externalizing behaviors and inconsistent discipline for male children across 4th-8th grades; evidence of parent effects were not detected. The stability of child externalizing behavior decreased from 5th to 6th grade. Stability of parental inconsistent discipline was found, but parental monitoring decreased over time suggesting the stability of parenting may vary by the type of behavior examined.

Child Temperament

Infant temperament has long interested psychologists and developmental scientists. Rothbart and Bates (2006) conceptualized temperament as a constellation of moderately stable, biologically based, behavioral proclivities or traits. Researchers have also considered temperament as a style; that is, in an aggregate form (i.e., easy, difficult, slow-to-warm-up; Thomas & Chess, 1977). Moreover, both approaches theorize, and empirical investigations support, temperament is relatively consistent and stable across infancy and childhood (Bates, 1989; Lemery, Goldsmith, Klinnert, & Mrazek, 1999; Rothbart & Derryberry, 1981). Overtime, these traits are believed to affect behavior and contribute to the formation of one's personality (Rothbart & Bates, 1998).

Difficult temperament has been operationalized as negative emotionality, high reactivity, and fearfulness (Rothbart & Bates, 1998). Research has demonstrated a clear connection between temperamental difficulty and children's later behavior problems during the preschool and elementary school years (e.g., Blair, 2002; Eisenberg et al., 1996; Shah et al., 1996). For example, Lawson and Ruff (2004) reported maternal ratings of children's negative emotionality during infancy predicted mothers' general assessment of children's behavior problems at 3.5 years. Guerin et al. (1997) demonstrated difficult temperament, assessed when children were 18 months, was related to parents' reports of clinical and nonclinical levels of behavior problems from early through middle childhood.

Belsky (1990) suggested difficult children were more likely to elicit harsh parenting compared to easy children. The temperament literature provides some evidence that children exhibiting higher negative emotionality elicit more negative, harsh and controlling behaviors from their parents (e.g., Lengua & Kovacs, 2005). For example, maternal report of child negative emotional affect (e.g., anger, frustration, sadness), predicted observed maternal negativity (e.g., frustration, anger, disappointment) during mother-child interactions among a sample of ethnically diverse children in early and middle childhood (Wang, Deater-Deckard, & Bell, 2013). Gauvain and Fagot (1995) found mothers' reports of children's temperament (easy vs. difficult) at 7 to 15 months old predicted mothers' use of disapproving and interrupting strategies during a dyadic problem solving task when children were 2.5 years old. Together, these findings suggest the relation between mothers' perceptions of children's temperament and mothers' subsequent use of harsh parenting strategies is relatively robust across childhood. It

should be noted, there is also some evidence that harsh parenting (e.g., control) predicts more negative emotionality in children (Eisenberg et al., 1999), suggesting a potential bidirectional relation between children's negative affect and parents' utilization of negative parenting behaviors. In accord with the differential susceptibility hypothesis, children with difficult temperaments are expected to be more affected by harsh parenting because they are less able to cope, regulate and respond to negative childrearing environments.

Belsky's (1997, 2005; Belsky & Pluess, 2009; Ellis et al., 2011) differential susceptibility hypothesis helped to advance the study of temperament to consider not only the effect of temperament on children's outcomes but also the concomitant effect of the quality of the childrearing environment. The differential susceptibility hypothesis contends that temperamental reactivity and negative emotionality are 'plasticity factors' whereby the effects of these traits on later development are influenced by the quality of one's environmental contexts (Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007). In this model, infants with temperamental difficulties who experience suboptimal environments are hypothesized to be at-risk for negative behavioral and social outcomes. In contrast, these same infants are hypothesized to develop optimal outcomes when provided sensitive and supportive childrearing environments (Belsky, 1997, 2005). Several empirical studies provide evidence to support this hypothesis (e.g., Belsky, Hsieh, & Crnic, 1998; Mesman et al., 2009; Pluess & Belsky, 2009; Stright, Gallagher, & Kelley, 2008). For example, Poehlmann and colleagues (2012) found infants with higher scores on proneness to distress at 9-months predicted mothers' reports of children's externalizing behavior problems at 36-months when mothers were observed to be more

critical, angry and frustrated with their infants during the 9-month dyadic play task. Moreover, infants with higher scores on proneness to distress were less likely to be reported as having externalizing behavior problems when their mothers' parenting at 9-months was observed to be positive and connected. Bradley and Corwyn (2008) reported infants' difficult temperament, averaged across assessments at 1- and 6-months, predicted teachers' reports of children's externalizing behaviors during first grade, with difficult children experiencing sensitive parenting evidencing significantly lower scores on externalizing, and difficult infants experiencing harsh parenting exhibiting marginally higher scores on externalizing behavior problems.

Researchers have established clear connections between 1) difficult temperament and children's behavior problems, 2) harsh parenting and children's negative and aggressive behaviors, and 3) temperamentally difficult children's differential susceptibility towards negative developmental outcomes when childrearing environments are unsupportive and harsh. Traditionally, studies have considered the effects of temperament on children's behavior as partially a function of the parenting environment (i.e., quality of the childrearing environment moderates the relation between temperament and child outcomes). However, it is also plausible that the effect of parents' behaviors on children's behaviors is contingent on children's temperament (i.e., children's temperament moderates the effect of parenting on children's development). In support of this contention, Chen and colleagues (2014) found maternal negativity predicted children's behavior problems only when children were rated highly on negative affect. This research suggests maternal harsh parenting practices elicit more negative developmental outcomes among children who are high on negative affect. Although

statistically both approaches are the multiplicative term of temperament by parenting quality, the interpretation and resulting implications are quite different. Examining parents' behaviors as the moderator suggests the influence of temperament on development is contingent on parenting quality. In contrast, investigating temperament as a moderator suggests the effect of parents' behaviors on children's outcomes is contingent on how the child evaluates and responds to parents' efforts. Arguably both methods represent valid approaches to studying relations between children's characteristics, the childrearing environment, and children's developmental outcomes; however, the latter approach has not been sufficiently investigated, and is likely important for prevention and intervention efforts aimed at reducing the effects of poor parenting on children's development and well-being.

Maternal Neuroticism

Psychologists have long argued that personality plays an integral function in parenting. In his process model of the determinants of parenting, Belsky (1984) theorized that parents' characteristics, contextual sources of support and stress, and children's characteristics multiply determine parenting. Moreover, he asserted that among these determinants, parents' characteristics, and personality in particular, were most influential. Belsky posited that personality influenced parenting directly and indirectly through effects on other parental contexts including, for example, social support and marital quality. Systemic theories have also contended that personality is an influential antecedent of parenting (Bornstein, 2002; Holden, 2009). Finally, Bronfenbrenner and Morris's (2006) revised bioecological model of development posited that personality is an important ecological context of children's development.

Despite theoretical support for the importance of including parents' personality in studies of parenting, parent-child relationships, and children's development (Abidin, 1992; Belsky, 1984; Bornstein, 2002; Bronfenbrenner & Morris, 2006; Holden, 2009), several developmental scholars have suggested that the field of developmental science has largely neglected the role of personality in studies of parenting and child development (Belsky & Barends, 2002; Bornstein et al., 2011; Prinzie et al., 2009). Although numerous studies have considered the role of personality in parenting in the last three decades, neuroticism, a widely accepted domain of personality, has garnered the most interest from researchers. A majority of these studies have examined negative emotionality and depression, neglecting hostility and anxiety, two important domains of neuroticism (Belsky & Barends, 2002). Moreover, these studies have largely focused on very young children or clinical samples (for exceptions see, Kochanska et al., 1997; Bornstein, Hahn, & Haynes, 2011; Prinzie et al., 2004). In this regard, scientists have argued more work is needed to evaluate how personality relates to variation in every day parenting and parent-child interactions.

Neuroticism was particularly of interest because of the potential for this parental characteristic to potentiate negative or coercive patterns of parent-child interaction (Belsky & Barends, 2002). Neuroticism refers to a continuum of emotional adjustment with emotional stability on one end and emotional instability on the other. Moreover, it reflects the tendency to be highly reactive and negative. Individuals high on neuroticism are emotionally insecure; are prone to anger, anxiety and worry; have unrealistic ideas; and more often utilize maladaptive coping strategies than individuals low on neuroticism (Belsky & Barends, 2002; Bornstein et al., 2011).

Neuroticism has generally been related to less competent, power assertive parenting in studies utilizing both self-reported parenting and observed parenting behaviors (e.g., Belsky, Crnic, & Woodsworth, 1995; Clark, Kochanska, & Ready, 2000; Kochanska, Clark, & Goldman, 1997; Kochanska et al., 2004; Losoya, Callor, Rowe, & Goldsmith, 1997; Metsapelto & Pulkkinen, 2003; Prinzie et al., 2004). For example, Conger and colleagues (1984) found high levels of emotional distress were positively related to mothers' use of negative parenting behaviors (e.g., threats, physical discipline) during structured parent-child interactions among a sample of rural mothers with preschool aged children. Moreover, these mothers were more likely to report endorsing authoritarian childrearing values. In a cross-sectional investigation of mothers and their 4-14 year-old children, Ellenbogen and Hodgins (2004) found maternal neuroticism predicted poor parenting (e.g., less support and structure), and children of neurotic parents were statistically more likely to be rated as having externalizing behavior problems by parents, teachers and clinicians. It should be noted that although fairly consistent evidence exists for a direct relation between neuroticism and poor parenting, not all studies have found these relations (e.g., Clarke, 2006; Smith et al., 2007; Turner, Beidel, Roberson-Nay, & Tervo, 2003). Bornstein and colleagues (2011) suggested studies failing to find statistical links between neuroticism and incompetent parenting may be due to the facet of neuroticism that relates to individuals' concerns for others. Overall, maternal neuroticism seems to be directly related to more undesirable parenting practices across development; however, it is also possible that differences in parents' interpretations and responses to children's behaviors differ by neurotic tendencies.

Prinzle and colleagues (2009) posited that neurotic parents may be more likely to negatively evaluate their children's negative behaviors. Research from the developmental literature has found parents who perceived their children's general behaviors as intentional and negative were more likely to respond negatively when children displayed affectively negative behaviors (Dix et al., 1986; Dix et al., 1989). Moreover, neurotic parents may be less capable of responding contingently and sensitively to their children (Prinzle et al., 2009), presumably because of their proneness toward insecurity in relationships, self-doubt, anger, anxiety, and worry. In this regard, neuroticism may moderate mothers' reactions to children's negative behaviors, with parents high in neuroticism more likely to respond harshly to children's negativity than parents low in neuroticism.

Theoretical support for neuroticism as a moderator of children's influences on parenting can be drawn from the diathesis stress model. The main tenet of this model suggests individuals vary in their risk to environmental stressors based on the presence of particular diatheses, including personality (Sigelman & Rider, 2015). In this regard, maternal neuroticism may represent a diathesis that predisposes mothers to be more hostile in response to children's characteristics and behaviors (e.g., environmental stress). For example, when confronted with children's behaviors that are negative, aggressive, noncompliant or otherwise challenging (i.e., negative environmental influence) neurotic mothers may be particularly susceptible to responding in a highly reactive, negative fashion. Gottman and colleagues (1998) research with newlywed couples demonstrated a link between neuroticism and individuals' proclivity to respond to marital conflict with negative affect. Although this research stems from a different population, it does provide

evidence that neurotic individuals may be more likely to respond in-kind to conflict and negative emotions. It is possible a similar link may exist in parent-child relationships.

Present Study

The extant literature and theory reviewed herein supports the notion that mothers' use of hostile behaviors and children's engagement in negative behaviors may mutually influence each other's behavioral responses in and through time. Moreover, individual characteristics are likely to influence mother-child relations. Therefore, the first goal of the current investigation was to determine whether maternal hostility and child negativity during mother-child interactions were reciprocally related across development from early to middle childhood. The second goal of this study was to identify for whom this process was most salient.

To address these goals several research questions and hypotheses were offered. First, the author sought to address the question, does maternal hostility lead children to become more negative, or do negative children elicit more hostility from their mothers, as assessed in-the-moment during dyadic interactions? Given the wealth of research on unidirectional relations between both parent behaviors predicting child behaviors (e.g., Hoeve et al., 2009; Rubin & Burgess, 2002), and child behaviors predicting parent behaviors (e.g., Deater-Deckard et al., 2012; Wang, Deater-Deckard, & Bell, 2013), as well as some support from bidirectional studies (e.g., Pearl et al., 2014; Pardini et al., 2008), a transactional process was hypothesized such that hostile parenting would elicit negative responses in children, which would reciprocally contribute to mothers' continued use of hostile behaviors. The socialization literature would suggest a stronger parent-to-child effect in very early childhood (i.e., 3 years old) relative to early (i.e., 5

years old) and middle childhood (i.e., 7-11 years old) when children spend more time with their parents and are more susceptible to their influence (e.g., Bugental & Grusec, 2006). Although a significant parent-to-child effect is expected across time owing to parents' increased expectations for children's social development, a decrease in the magnitude of the relations is hypothesized around the time of entry to formal schooling (i.e., first grade), as peers and teachers represent a new, significant source of socialization, and parents are less relied upon for both socialization and instrumental support. As regards shifts in the child-to-parent effects, an increase in the magnitude of relations is expected given that, despite being less frequent, negative child behaviors elicit harsher parenting behaviors as children age (Bugental & Happaney, 2002; Rubin & Burgess, 2002), likely due to parents growing intolerance for behaviors perceived as inappropriate (Dix et al., 1986; Dix et al., 1989).

The second research directive asked whether there was longitudinal stability in within domain behaviors across development. Research has consistently found maternal hostility and child negative affect and problem behaviors to be stable over time in both studies investigating unidirectional and reciprocal relations (Cairns et al., 1988; Coie & Dodge, 1983; Cummings et al., 1989; Eisenberg, 2012; Lansford et al., 2011; Newland, Ciciolla, & Crnic, 2015; Wu et al., 2014); however, the stability of these behaviors suggests trait-like characteristics (e.g., negative affectivity). Examining longitudinal stability, as measured in-the-moment, provides clarity for understanding whether there is continuity in how individuals behave in interactions across time. It is possible that behaviors captured in-the-moment may be less stable than general proclivities to behave in certain ways. Moreover, self-report measures are open to influence by the individual's

overall perception of the other person and influence from behaviors that occurred outside the specified time (e.g., in the past 6 months). The current study utilized observed behaviors which eliminate reporter biases. Maternal hostility was predicted to be stable across assessments; however, child negativity was hypothesized to show increased rank-order stability across development, particularly during early childhood, as children's behaviors become more reflective of overall trait-like tendencies.

In order to investigate whether children with a temperamental proclivity toward anger and frustration were more likely to develop coercive mother-child relationships, the third research question posited whether anger and frustration moderated the reciprocal relations between maternal hostility and child negativity, as measured in-the-moment, across early and middle childhood? Given the likelihood children with difficult temperaments will be more negative, will react more poorly to environmental stress, and are not well regulated (Eisenberg et al., 1999; Rothbart, 2004; Rothbart, 2012; Rubin, Coplan, Fox, & Calkins, 1995) regardless of their mothers' behaviors, children scoring high on anger and frustration were expected to respond poorly to parenting net of the moment-to-moment effects. In this manner, it was expected that the reciprocal relation between maternal hostility and child negativity would be significant for only those children who scored high on temperamental anger and frustration. Furthermore, among children scoring high on temperamental anger and frustration, maternal hostility was expected to be more influential from 54-months to first grade, than from first to third grades and third to fifth grades owing to a) younger children are less autonomous (e.g., Eccles, 1999), b) mothers spend more time in close proximity to younger children (e.g., Collins, Madsen, & Susman-Stillman, 2002; Kuczynski & Grusec, 1997), c) temperament

is more malleable during early childhood (Grusec, 2002; Rothbart, 2012), d) young children are generally less well-regulated than older children (Eisenberg, 2012), and e) socialization efforts by parents are likely stronger before entry to formal schooling and the formation of strong peer relationships (see Hartup, 1985; Hartup, 1996; Rubin & Burgess, 2002).

Finally, given theoretical and empirical support for the negative effect of maternal neuroticism on parent-child relations, the fourth research question sought to address if maternal neuroticism moderated the relation between child negativity and maternal hostility across early and middle childhood. Given neurotic individuals' general proclivities towards highly reactive, negative and emotionally unstable behaviors (e.g., Belsky, Crnic, & Woodsworth, 1995; Clark, Kochanska, & Ready, 2000; Prinzie et al., 2004), and links between child negative behavior harsh parenting behaviors (e.g., Caspi & Moffit, 1995; Dumas & Wekerle, 1995; Ge et al., 1996; Patterson, 1982; Patterson, Reid, & Dishion, 1992; Pettit et al., 2001), neuroticism was expected to moderate the relation of child negativity on maternal hostility across time with neurotic mothers scoring higher on hostility in response to child negativity than mothers scoring low on neuroticism. Furthermore, research has shown relations between maternal hostility and child negativity decline across development (e.g., Bradley, Pennar, Iida, 2015), presumably because children gain autonomy and the overall time spent parenting decreases (e.g., Bornstein, 2015; Eccles, 1999). Therefore, it was also hypothesized that among neurotic mother-child dyads, maternal hostility and child negativity would be more tightly linked across time, evidencing a slower decline in the decoupling of these behaviors relative to non-neurotic mother-child dyads.

The current investigation offers several advances to the study of parenting and developmental science. First, data were utilized from the Eunice Kennedy Shriver National Institute of Child Health and Human Development, Study of Early Child Care and Youth Development, a prospective, longitudinal study of children and their parents. The longitudinal design of the study and the analytical strategy of the current investigation allow for simultaneously modeling parent and child reciprocal effects, controlling for each individuals' previous (i.e., autoregressive effects) and moment-to-moment behaviors (i.e., synchronous effects). Moreover, these data come from typically developing children. Many studies investigating the effects of harsh parenting on children's development have relied on primarily clinical samples (e.g., Belsky, Crnic, & Woodworth, 1995; Lytton, 1990). This study will offer insight into the development of negative parent-child interaction patterns among the normative population. Third, maternal and child behaviors were observed in the same measurement paradigm which allows for considering the process through which moment-to-moment interactions influence reciprocal relations. Moreover, the observational measures of parent and child behavior eliminate reporter bias. Many studies have relied on parents' reports of parent and child behavior which are likely collinear and biased towards parents' perceptions. Although there are benefits to self-report measures, observational measures are more likely to represent the actual behaviors that occurred (see Goodnow, 2002). Fourth, this investigation considered the role of individual characteristics (i.e., temperament and neuroticism) that may potentiate the parent and child effects between maternal hostility and child negativity. Both of these person-characteristics have been theoretically and empirically demonstrated as consequential for parenting practices, parent-child relations,

and children's development (e.g., Belsky, 1984; Belsky, Bakermans-Kranenburg, & van IJzendoorn, 2007; Bornstein, 2002; Chen, Deater-Deckard, & Bell, 2014; Kochanska, Clark, & Goldman, 1997; Prinzie et al., 2004). Moreover, identifying for whom and when in the course of development negative and coercive parent-child interactions are most likely to develop will help to focus prevention and intervention efforts aimed at ameliorating the negative developmental consequences of harsh parenting and children's negative behaviors. This study will be able to offer new insight into the transactional nature of parent-child relations, accounting for the moment-to-moment effects of behaviors, and the conditions under which these processes are mostly likely to develop.

Method

Participants

The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development (SECCYD) was a multisite, prospective longitudinal study of child development. Families with healthy newborns were recruited in 1991 from 24 hospitals located near 10 research sites in geographically diverse areas of the United States (NICHD, 2006). Data collection began when children were one month of age and the sample consisted of 1,364 children and their families from diverse ethnic, economic and demographic backgrounds.

The current sample consisted of 1,364 families for whom mother-child observational data were available at 36- and 54-months, and grades 1, 3, and 5. Data were available for 1161 families at 36-months, and 1040, 1004, 987, 937 families at the 54-month, grade 1, grade 3, and grade 5 waves, respectively. The sample included 51.4% male children. Families identified as 81.6% Caucasian, 11.9% African American, 4.6%

Hispanic, and 1.9% other. At the first assessment, mothers were approximately 28.3 years old ($SD = 5.6$, range = 18-46), and 70% had at least some college education, with 9% of mothers having completed less than a high school education.

Procedure and Measures

Mother-child observation. The purpose of the mother-child interaction task was to assess the quality of maternal (e.g., hostility) and child behavior (e.g., negativity), in the context of the mother-child dyad, during semi-structured teaching and play activities. At each assessment, 15-minute mother-child observations were videotaped. To be eligible for scoring, 65% or more of the observation had to be recorded. Observations were conducted during scheduled laboratory visits, with the exception of the grade 3 observation which occurred in families' homes. Procedures for the observations were standardized across all 10 sites.

The 36-month observation consisted of three tasks. Mother-child dyads were presented with three colored boxes each containing a toy. The red box held markers, paper and stencils. The blue box had dress-up clothes, a cash register, and 8 pennies. The green box contained Duplo blocks and a picture of a constructed model. Mothers were instructed to play for 15 minutes with the three boxes beginning with the red and ending with the green. They were told to play as they would at home if their child had received a new toy.

The 54-month assessment included two tasks too difficult for the child to complete independently, and a third pretend play task. Again, materials were presented to the mother-child dyad in 3 boxes. The first task was to complete a maze taped onto an Etch-a-Sketch. The second task required building a series of towers from blocks of

varying shapes and sizes. The final box contained 6 animal hand puppets that could be used for pretend play. Mothers were instructed to play as they would at home.

When children were in first grade, the dyadic observation included two semi-structured teaching tasks and a play situation. The first teaching task required the mother and child to work together by each controlling a knob on an Etch-a-Sketch to draw a picture of a house and tree. The second task consisted of a patterned block activity which required the child to fill-in geometric shapes using colored blocks. The play situation consisted of a card game. Mothers were instructed to work together with their child on the Etch-a-Sketch task. For the block activity, mothers were asked to first allow their child time to work independently and then to provide help as needed. Instructions for the card game were to play together.

At grade 3, mothers and children engaged in a problem-solving activity for which they planned a series of 11 errands utilizing a map depicting a town. Dyads were instructed to start and end their errands at “home” and to optimize the route such that they made only one trip. Eight minutes were allocated for this task. The second activity was a discussion on rules; however, given the nature of the task and no equivalent available at previous assessments, only scores for the problem-solving task were utilized in this investigation.

The final assessment occurred when children were in fifth grade and paralleled the structure of the third grade observation. The problem-solving task involved creating a bungee jump for a raw egg using provided materials (e.g., structural frame, egg, panty hose, ruler, scissors, masking tape, 40 pennies). Dyads were instructed to construct a bungee that would allow the egg to come within 2-inches of the floor, but without

touching the floor or breaking the egg. Participants were given 7 minutes to complete the activity and were told to have fun.

Observational ratings. Coding of all videotaped interactions occurred at a central location by individuals who did not have information about the families and who were not involved in administering the dyadic interaction tasks. All coders were trained and supervised, and careful consideration was given to ensure inter-rater reliability. The rating scale used to assess maternal behavior was adapted from the Teaching Task Rating Scales (Egeland & Hiester, 1993), and the child rating scale was adapted from the Rating Scales for Parent-child Interaction in Preschoolers (Pianta, 1994).

Maternal hostility represents the mother's expression of anger directed toward the child, rejecting the child, blaming the child for mistakes, or explicit messages belittling the child. Example hostile behaviors included negative or sarcastic tone of voice, rolling eyes, giving a stern look, arguing with the child, verbally disapproving of the child, or hurtful/restrictive physical touch. Hostility was measured on a 7-point Likert scale (1=*no sign of rejection or blaming* to 7=*frequent expression of rejection and barely controlled anger*). The hostility score for the first three waves of assessment reflected observed maternal hostility during the entire observation; whereas hostility scores utilized for the grades 3 and 5 assessments were specific to the problem-solving task. Reliability estimates calculated from repeated measures Analysis of Variance (ANOVA) for maternal hostility ranged from .74-.88 across the five waves of data collection. Hostility scores were heavily positively skewed and leptokurtic due to low occurrence of hostility during the interaction tasks. In an effort to normalize the distribution of the data, square root, log base 10, and reciprocal transformations were estimated (Kline, 2011;

Tabachnick & Fidell, 2013). Each of these approaches failed to normalize the distribution of the data; therefore, following recommendations by Finkel (1995), hostility was recoded as a binary score (0=*no sign of hostility* to 1=*any displayed hostility*). Although the distribution remained nonnormal, it was more satisfactory than efforts at transformation.

Child negativity reflects the overall level of externalizing negative affect demonstrated by the child toward the mother. Example negative child behaviors included repeated overt displays of anger, resistance toward mother, negative verbalizations or rejections of mother's ideas, or pouting. Negativity was measured on a 7-point Likert scale (1=*no signs of negativity* to 7=*repeated overt anger or resistance*). As with maternal hostility, child negativity scores at 36-months, 54-months, and grade 1 were scored across all three tasks. The scores for the grades 3 and 5 observations were only in regard to the problem-solving activity. Reliability estimates calculated from repeated measures ANOVA for child negativity ranged from .69-.89 across the five waves of data collection. Negativity scores across all assessments were positively skewed and leptokurtic due to low levels of negative affect displayed during the dyadic interaction tasks. To reduce nonnormality, transformations were also estimated for the child negativity scores; however, transformations failed to normalize the data. As with maternal hostility, child negativity was recoded as a binary score (0=*no signs of negativity* to 1=*any displayed negativity*). This approach led to the best possible distribution of the data while simultaneously preserving the overall number of observations available for analysis (Finkel, 1995).

Temperamental anger and frustration. Temperament was assessed by maternal report at 54-months using an adapted version of the Children's Behavior Questionnaire (Rothbart, Ahadi, & Hershey, 1994). The SECCYD utilized 80 of the original 196 items, composing 8 of 15 scales. Mothers were asked to rate how likely their child would be to respond to each situation (item) in the past 6 months on a 7-point rating scale from *extremely untrue* to *extremely true*. For this investigation, the 7-item anger and frustration scale, reflecting the extent to which the child displayed negative affect related to task interruption or goal blocking, was used to indicate a temperamental proclivity towards anger and frustration. Example items included, "Has temper tantrums when he doesn't get what he wants" and "Gets quite frustrated when prevented from doing something she wants to do." Higher scores reflect greater anger and frustration. The original 7-item scale evidenced moderate internal reliability (Cronbach's alpha = .76).

For the purposes of the current investigation, multigroup models were utilized to assess moderation. Given the likelihood of finding moderation at the extremes, if it is in fact supported, a one standard deviation above and below the mean approach was used to form groups. Specifically, the mean of the anger and frustration scale was 4.74 ($SD = .83$, range = 1.6-6.9) for the entire sample. Children scoring one standard deviation below the mean (1.6-3.91) were scored zero and children scoring one standard deviation above the mean (5.57-6.9) were scored one, resulting in a total sample of 351 with 49.6% of these children scoring one. Moderation was assessed with this subsample of children with an extreme score on either side of the continuum for anger and frustration.

Maternal neuroticism. Maternal personality was assessed using three subscales (neuroticism, extraversion, and agreeableness) taken from the NEO Personality Inventory

(Costa & McCrae, 1978) when children were 6 months old. For the purposes of the current investigation, only the neuroticism subscale score was utilized. Neuroticism was composed of 12-items originally reported on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*). Sample items included feeling inferior, often angry, tense/jittery, and worthless. The neuroticism subscale score was the sum of the original 12 items, with actual subscale scores ranging from 13 to 59. Higher scores indicate greater emotional instability (i.e., more neurotic). The neuroticism subscale had high internal consistency (Cronbach's $\alpha = .84$). Factor analysis with Varimax rotation confirmed the factor structure of the data aligned with the structure reported for the NEO Personality Inventory.

In order to conduct a multigroup test of moderation by neuroticism, the mean of the subscale score was calculated ($M = 29.77$, $SD = 7.16$). Akin to child anger and frustration, evidence of moderation by neuroticism was expected at the extreme ends of the distribution; however, despite a near normal distribution, utilizing a standard deviation approach for rescaling the variable led to problems with model estimation. Therefore, despite the risk of null findings for tests of moderation between groups (i.e., moderation may not be evident at less extreme levels), a mean split was utilized for the current investigation in order to achieve model convergence. Mothers with subscale scores at or below the subscale mean were coded '0', and mothers with subscale scores above the mean were coded '1', resulting in a binary construct amenable for assessing moderation utilizing the multigroup structural equation modeling approach. Of the original sample, 1,272 mothers had neuroticism scores and were included in the tests for moderation with nearly half scoring above the mean (46.9%).

Data Analytic Plan

A series of cross-lagged panel models were estimated using weighted least squares means and variance adjusted (WLSMV) in *Mplus* (v. 7.4) to model the autoregressive (i.e., stability paths), synchronous, and reciprocal (i.e., cross-lagged) relations between maternal hostility and child negativity across development from 36-months to fifth grade (see Figure 1). Panel analysis is useful for determining whether cross-lagged effects are reciprocal and to determine whether lagged paths are time variant (Selig & Little, 2012). The presence of cross-lagged effects requires relations between constructs to exist beyond the within-construct stability. Moreover, estimating the autoregressive effects determines the stability of the construct across time (Selig & Little, 2012). Inclusion of the synchronous effects allows for a more precise understanding of the reciprocal effects, as models estimating covariances between the within-time associations do not fully account for the effect of the within-time relation on the reciprocal process. Consequently, in order to assess whether a reciprocal relation existed between maternal hostility and child negativity across early and middle childhood, a hybrid cross-lagged panel model was fit to the data which included autoregressive, synchronous, and cross-lagged paths. However, it should be noted that hybrid models are not identified. The recommended procedure to identify hybrid models is to constrain the autoregressive paths to be equal (Little, 2013); therefore, prior to specifying the hybrid model, an autoregressive model was fit to the data to determine whether constraining the autoregressive paths was a reasonable approach to obtain model identification for this data. Moreover, this model helped to establish whether maternal hostility and child negativity demonstrated rank-order stability over time, respectively.

After determining an autoregressive model, synchronous and cross-lagged paths were included in the model. In order to examine whether there were significant shifts in the lagged paths across time (i.e., time variant paths), model comparison tests were conducted. First a model with freely estimated paths was fit to the data. Then, the cross-lagged paths, for example from mother-to-child, were constrained to be equal. Subsequently, a nested model chi-square comparison test is calculated to determine whether the equality constraint significantly worsened model fit. If model fit is not significantly decreased then time invariance is concluded and the equality constraints are retained in the model. If, however, model fit significantly worsens then the equality constraint is removed indicating time variance between the like-paths. In this procedure, like-paths are tested sequentially. That is, first the procedure is conducted for the mother-to-child cross-lagged paths. Once a determination is made as regards freeing or constraining these parameters this model becomes the baseline model. Then the next set of paths are constrained (e.g., child-to-mother cross-lagged paths) and a nested model comparison test is calculated to determine if model fit was worsened by adding the new equality constraints. If model fit significantly decreases with the omnibus test, it is also possible to conduct pair-wise tests to determine time invariance between fewer paths (e.g., 3 of 4 child-to-parent lagged paths). This allows the researcher to determine whether all paths are time varying or only a subset of paths.

After establishing a model of reciprocal mother-child relations accounting for within-construct stability and the effects of individuals' behaviors within-time, a multigroup structural equation approach was utilized to independently assess the presence of moderation by child temperamental anger/frustration and maternal neuroticism. First,

because the *Mplus* modeling software only allows for one equality constraint to be set for a given path in an analysis, and the overall model (see Figure 3) indicated the cross-lagged paths should be modeled as equal across time, the multimodel procedure was utilized. This procedure allows for specifying an overall model and independent models for each group. For the current analysis, this procedure included three models: an overall model and a model for each of two groups (e.g., one standard deviation above and below the mean on anger/frustration). *Mplus* simultaneously fits each model and allows for different sets of equality constraints within a model. For example, mother-to-child cross lagged paths can be constrained to be equal across time for one group and freely estimated across time in the second group. Nested model comparison tests allow the researcher to identify the best fitting model for each group. After establishing independent group models, the multigroup procedure is implemented to test for moderation between the two groups. Specifically, like-paths in each group (e.g., negativity at 36 months regressed on hostility at 54 months) are tested for equality using a chi-square test. A significant test indicates the paths are significantly different from each other and supports the presence of moderation in that path. Paths that are freely estimated across-time for a given group (i.e., time varying mother-to-child cross lags) are tested individually, whereas paths that are constrained to be equal with other paths within that group (i.e., time invariant child-to-parent cross lags) are tested as a group compared to those same paths in the other group.

All analyses included maternal age, education, ethnicity, total family income, and child sex as covariates, as each of these constructs have been related to the primary relations of interest (e.g., Bornstein, 2002; Darling & Steinberg, 1993; Deater-Deckard

&Dodge, 1997; Hoff, Laursen, & Tardiff, 2002; Kiff, Lengua, & Zalewski, 2011; Magnuson & Duncan, 2002; Pinderhughes et al., 2001). There are several plausible approaches to including covariates in cross-lagged panel models with a lack of clear evidence for the best approach (Little, Preacher, Selig, & Card, 2007); therefore, the current study examined two approaches. First, the effects of the covariates were accounted for at the first assessment. This approach assumes the effect of the covariates is an exogenous process that is accounted for directly at the first assessment and indirectly at all future assessments of the constructs (Little et al., 2007). Second, a model with all endogenous indicators regressed on all of the covariates was fit to the data. This approach assumes there is a direct effect of the covariates on each indicator and removes this shared variance at each endogenous assessment (Little et al., 2007).

Several tests of model fit are available to assess whether the model demonstrates good or poor fit to the data. Moreover, there are several benchmarks for determining whether the fit of a given test is poor or good. For the purposes of this investigation, the chi-square test of model fit, root mean square error of approximation (RMSEA), and comparative fit index (CFI) were reported following conventional approaches to reporting in the field (Kenny, 2015). Chi-square tests should have an associated p-value greater than .05 to indicate reasonable fit; however, sample sizes greater than 400 nearly always reach statistical significance (Kenny, 2015). Given the large sample size in the current investigation ($N = 1364$), the chi-square test may not be a reasonable measure of fit. Little's (2013) benchmarks for interpreting RMSEA and CFI were utilized. Little offered the following RMSEA guidelines: poor fit ($> .10$), mediocre fit ($.10-.08$), acceptable fit ($.08-.05$), good fit ($.05-.02$), and great fit ($< .01$). Guidelines for CFI are as

follows, poor fit ($< .85$), mediocre fit ($.85-.90$), acceptable fit ($.90-.99$), very good fit ($.95-.99$), and outstanding fit ($> .99$).

Results

Descriptive Statistics

Descriptive statistics and bivariate correlations for maternal hostility, child negativity, child anger and frustration, and maternal neuroticism are shown in Tables 1 through 4. Maternal hostility was observed during mother-child interactions 18-34% of the time, with the highest percent of occurrence during first grade. Maternal hostility was relatively consistent through time with a decrease in prevalence at 5th grade. Bivariate correlations for maternal hostility were consistent across time, albeit stability estimates were low ($.19-.26$). Observer reported child negativity ranged from 16% to 44% with the highest occurrence at 54 months, and a decrease in negativity at third grade. The bivariate correlations were fairly consistent across adjacent time points (e.g., 36 months to 54 months) with the exception of the grade 3 assessment. However, as noted for maternal hostility, the estimates were low ($< .20$) indicating the stability of negativity was low.

Associations between maternal hostility and child negativity were positive. Three interesting patterns emerged. First, the within time associations between maternal hostility and child negativity evidenced the greatest stability ($.23-.32$) relative to within-person and cross-person, cross-time associations. These estimates were significantly positive with displayed maternal hostility related to displayed child negativity in-the-moment, at all ages. Second, correlations across time-lags were low and significant for only two of four lags. Specifically, hostility at 54 months was positively associated with child negativity at 1st grade, and hostility at 3rd grade was positively related to negativity

at 5th grade. It is worth explicitly stating that these relations do not represent true lags but rather the association between behaviors from one time to the next. In other words, no direction of effect is intended. Finally, early child negativity at 36 months was significantly positively related to maternal hostility across all assessments, though stability after the within time association was low (.09-.14).

Child temperamental anger and frustration was positively associated with child negative behavior at all assessments, albeit coefficients were low (.07-.09). Maternal neuroticism was positively correlated with maternal hostility across assessments except at fifth grade for which the relation was marginal. Stability was also low between maternal neuroticism and maternal hostility across time (.06-.10).

Hybrid Cross-Lagged Panel Model

To address the goals of the study, a series of hybrid cross-lagged panel models were analyzed in *Mplus* (v. 7.4) using weighted least squares means and variance adjusted (WLSMV) and theta parameterization (Muthen & Muthen, 2012). Utilization of WLSMV results in probit regression coefficients. The covariance coverage matrix indicated missing data ranged from 14.9% to 38.1% on the primary variables of interest, and from 0% to 21.3% on the covariates. Given the duration of the study, attrition was relatively low from 36 months to fifth grade (19.3%, N = 224). Missing data were handled with the standard *Mplus* procedure with WLSMV estimation (see Muthen & Muthen, 2012). All mother-child dyads with available data at any of the assessments were included in the analyses (N = 1364).

Before examining the reciprocal relations in maternal hostility and child negativity across early and middle childhood, an initial autoregressive model was fit to

the data. Maternal hostility scores were regressed on maternal hostility at the prior assessment (e.g., grade 1 on 54 months). Moreover, child negativity scores at 54 months through grade 5 were regressed on child negativity at the prior assessment (e.g., 54 months on 36 months). The autoregressive model demonstrated poor fit to the data, $\chi^2(35) = 383.77, p < .001$, RMSEA = .096, CFI = .458. Modification indices indicated improvements in model fit would be obtained by adding stability paths in maternal hostility across longer time periods; therefore, three additional stability paths were added from maternal hostility at 36 months to maternal hostility at first, third and fifth grades, respectively. The additional three paths improved model fit, though overall fit remained poor, $\chi^2(32) = 342.95, p < .001$, RMSEA = .095, CFI = .517, $\Delta\chi^2(3) = 40.81, p < .001$. The inclusion of these paths indicates early maternal hostility at 36 months has an effect on the rank-ordering of future hostility independent of the time-sequential effect.

To test whether stability in maternal hostility and child negativity varied over time, respectively, equality constraints were imposed. The stability paths between each assessment of maternal hostility were constrained to be equal. The omnibus test indicated significantly worse model fit ($\chi^2(35) = 349.19, p < .001$, RMSEA = .091, CFI = .512, $\Delta\chi^2(3) = 8.68, p = .03$). To probe whether stability in maternal hostility varied between some but not all of the stability paths a follow-up analysis was conducted whereby the stability path from 36 months to 54 months was freed and the three subsequent stability paths were constrained to be equal. These constraints did not significantly worsen model fit and were therefore retained in the model ($\chi^2(34) = 343.76, p < .001$, RMSEA = .092, CFI = .519, $\Delta\chi^2(2) = 1.55, p = .46$). Overall, tests indicated the rank order stability of maternal hostility from 36 to 54 months varied from subsequent paths, but the three additional

paths did not significantly vary from 54 months to fifth grade. Equality constraints were then imposed on the child negativity stability paths through time. The omnibus test indicated significantly worse model fit ($\chi^2(37) = 354.15, p < .001$, RMSEA = .089, CFI = .507, $\Delta\chi^2(3) = 13.91, p < .01$). To probe whether stability in child negativity varied between some but not all of the stability paths a follow-up analysis was conducted whereby the stability path from 36 months to 54 months was freely estimated and the three subsequent stability paths from 54 months to grade 5 were constrained to be equal. These constraints did not significantly decrease model fit and were therefore retained in the model ($\chi^2(36) = 347.47, p < .001$, RMSEA = .090, CFI = .516, $\Delta\chi^2(2) = 5.14, p = .08$). Overall, tests indicated the rank-order stability of child negativity from 36 to 54 months varied from the remaining three stability paths, but paths from 54 months to fifth grade did not significantly vary. Finally, equality constraints were tested on the additional three autoregressive paths from maternal hostility at 36 months to maternal hostility at 1st, 3rd, and 5th grades. Constraining the path from maternal hostility at 36 months to grade 1 to be equal to the path from maternal hostility at 36 months to grade 5 did not significantly worsen model fit and was retained ($\chi^2(37) = 349.07, p < .001$, RMSEA = .088, CFI = .515, $\Delta\chi^2(1) = .38, p = .54$). The final autoregressive model is depicted in Figure 2 (see Appendix A for a table of model comparison tests).

After establishing the structure of the autoregressive model and determining equality constraints were statistically appropriate to identify the hybrid model, synchronous and cross-lagged paths were added to the model. The additional paths improved model fit ($\chi^2(22) = 91.54, p < .001$, RMSEA = .051, CFI = .928, $\Delta\chi^2(15) = 257.53, p < .001$), indicating the transactional model provided a better fit to the data than

the autoregressive model. Next, the five covariates were added to the model (maternal age, education, race, income, and child sex). Given covariates can be added in several ways, and research has yet to indicate which method is most appropriate for particular analyses or conceptualizations (Little et al., 2007), two approaches were compared. First, a model controlling for the covariates at the first assessment, thereby accounting for the ‘down-stream’ effect, was estimated. Second, a model controlling for the direct effect of each covariate on each indicator was fit to the data. The second approach indicated the covariates were non-significant at future time-points and may over-control the model; therefore, the first approach to including the covariates was utilized. This model resulted in good model fit to the data ($\chi^2 (52) = 145.04, p < .001, RMSEA = .036, CFI = .982$).

To test whether cross-lagged associations varied across time, equality constraints were imposed across the maternal hostility to child negativity cross-lagged paths (i.e., 36 months to 54 months, 54 months to grade 1, grade 1 to grade 3, and grade 3 to grade 5). The model specifying temporal invariance had good fit ($\chi^2 (55) = 151.05, p < .001, RMSEA = .036, CFI = .982$) and did not significantly differ from the model allowing temporal variance across these lags ($\Delta\chi^2 (3) = 7.17, p = .07$). A second set of equality constraints were imposed to determine whether the cross-lagged paths from child negativity to maternal hostility varied across time (i.e., 36 months to 54 months, 54 months to grade 1, grade 1 to grade 3, and grade 3 to grade 5). The model specifying temporal invariance in the child-to-parent cross-lagged paths had good fit to the data ($\chi^2 (58) = 151.42, p < .001, RMSEA = .034, CFI = .982$) and did not significantly decrease model fit ($\Delta\chi^2 (3) = 1.65, p = .65$). These tests indicated neither the parent-to-child nor the child-to-parent cross-lagged associations significantly differed over time. Finally, to

test whether the mother-to-child lagged paths significantly differed from the child-to-mother lagged paths, all lagged paths were constrained to be equal. This model evidenced good fit to the data ($\chi^2 (59) = 151.44, p < .001$, RMSEA = .034, CFI = .982) and did not significantly decrease model fit ($\Delta\chi^2 (1) = .02, p = .89$). This model comparison test indicated the effect of mothers' hostility on children's future negative behaviors did not significantly differ from the effect of children's negativity on mothers' future hostility (see Appendix A for a table of model comparison tests).

Path estimates for the hybrid cross-lagged panel model are depicted in Figure 3. Considerable stability in the maternal hostility and child negativity autoregressive paths was evidenced with stability appearing weaker at older ages compared to younger ages for both sets of paths. The positive association between maternal hostility and child negativity at 36 months showed that observed initial maternal hostility was associated with children's initial negativity albeit the effect was small in magnitude. The cross-lagged paths from maternal hostility at one assessment to child negativity at the next assessment (i.e. parent-to-child cross-lagged effects) evidenced temporal relations such that observed maternal hostility at 36 months, 54 months, grade 1 and grade 3 was significantly related to a decrease in the probability children would display negativity during mother-child interactions during subsequent assessments (i.e., 54 months, grade 1, grade 3, and grade 5, respectively), even after accounting for stability in child negativity and the moment-to-moment effects of hostility and negativity. However, as reported above, the parent-to-child lagged effects were time invariant suggesting the effect of maternal hostility on child negativity through time did not change.

The reciprocal relations from child negativity to maternal hostility (i.e., child-to-parent cross-lagged effects) from 36 months to grade 3 were significantly related to a decrease in the probability mothers would demonstrate hostility during mother-child interactions at 54 months, grade 1, grade 3, and grade 5, respectively, after controlling for stability in maternal hostility and the within time effects of hostility and negativity. The set of child-to-parent lagged paths did not vary over time indicating the child-to-parent effect does not shift significantly across development.

A direct comparison of mother-to-child and child-to-mother lagged paths indicated the effect of maternal hostility on children's future negativity did not statistically differ from the effect of children's negativity on future maternal hostility suggesting neither partner has a stronger influence on the reciprocal nature of the relationship, as measured in this study. Maternal education ($X\beta = -.10, p < .01$), race ($X\beta = -.25, p = .01$), and income ($X\beta = -.06, p < .01$) had significant associations with maternal hostility, whereas only maternal age ($X\beta = .03, p < .01$) was significantly related to child negativity. All other covariates were non-significant for both maternal hostility and child negativity.

Statisticians have acknowledged difficulty in estimating and interpreting synchronous paths in hybrid cross-lagged panel models (Little, 2013; Selig & Little, 2012). Given the lagged paths were hypothesized to be positive and were found to be negative, a cross-lagged panel model with estimated covariances between the within time constructs was estimated to check for potential suppression effects in the hybrid model (as shown in Figure 3). The cross-lagged panel model, which included the autoregressive structure outlined above, covariances between within time assessments, lagged paths, and

covariates controlled at the first assessment, evidenced good model fit ($\chi^2 (56) = 155.63$, $p < .001$, RMSEA = .036, CFI = .981). Although path estimates varied between this model and the hybrid model, the lagged paths were either significantly negative, or non-significant. The only significant positive association was found between child negativity at 36 months and maternal hostility at 54 months. Although this finding differs from the hybrid model, it is akin to results obtained in the moderation analyses presented below. Overall, the examination of the cross-lagged panel model with estimated covariances did not lead the researcher to suspect suppression effects in the hybrid model. Furthermore, the negative relations found in the hybrid model were robust to model manipulations. Therefore, given the research questions of interest, the hybrid model offers a superior approach to facilitate understanding the reciprocal nature of mother-child interactions because it allows the researcher to statistically control for the moment-to-moment effects (e.g., synchronous effects) when analyzing the cross-lagged paths.

Moderation by Temperamental Anger and Frustration

The second goal of this study was to determine whether children's temperamental (i.e., dispositional) proclivity toward anger and frustration moderated the reciprocal relations between maternal hostility and child negativity from 36 months to fifth grade ($N = 351$; see Table 1). Children with high temperamental anger and frustration were conceptualized as one standard deviation above the mean, whereas children low on anger and frustration were thought of as 1 standard deviation below the mean (i.e., mean reflected normal level of anger and frustration). Utilizing a standard deviation above and below the mean approach to form the groups allowed for creating meaningfully high and low groups, a clearer picture of the moderation (Aiken & West, 1991), and the highest

between-group variability. This approach optimizes the likelihood of detecting moderation while simultaneously clarifying the nature of potential moderated effects. Furthermore, given the nature of the sample, measures, and variables of interest, a linear effect of the moderator was not anticipated. It is reasonable to assume the effects of temperamental anger and frustration begin somewhere along the continuum (e.g., quadratic function) such that there is a threshold above which between-person effects exist. Finally, from a practical vantage, examining children one standard deviation above the mean will help to inform whether, and the extent to which, these children were likely to develop negative cycles of mother-child interaction, which would be useful for intervention and prevention efforts.

A multigroup structural equation modeling approach was used to assess moderation among mother-child dyads. The *Mplus* modeling software only allows for one equality constraint to be set for a given path in an analysis. The overall model (see Figure 3) indicated the cross-lagged paths should be modeled as equal across time. Therefore, the typical multigroup procedure would result in constraining these paths to be equal to each other across time and across groups, which may not be a valid assumption. In order to circumvent this software limitation, a two-step approach was utilized to assess the presence of moderation. First, the multimodel function was utilized to simultaneously fit independent models to each group. Then, the multigroup tests were conducted to determine whether paths were moderated by temperamental anger and frustration.

The autoregressive model was analyzed to determine whether the structure found in the overall model (see Figure 3) was similar for this sub-sample of dyads. First a model with only the time-sequential autoregressive paths ($\chi^2(64) = 138.75, p < .001$,

RMSEA = .082, CFI = .536) was compared to a model with the time-sequential paths and the three additional maternal hostility autoregressive paths ($\chi^2(70) = 145.32, p < .001$, RMSEA = .079, CFI = .532). In this multigroup model, inclusion of the additional maternal hostility stability paths across longer periods of time (e.g., 36 months to first grade) resulted in a significant decrease in model fit ($\Delta\chi^2(6) = 6.57, p = .36$); therefore, the three additional hostility stability paths were removed. Next to assess whether the time-sequential autoregressive stability paths demonstrated time invariance across all four lags a model comparison test was conducted whereby the autoregressive paths for both maternal hostility and child negativity was first freely estimated and then constrained to be equal, respectively. Constraining the maternal hostility stability paths to be equal did not significantly decrease model fit ($\chi^2(77) = 153.56, p < .001$, RMSEA = .076, CFI = .525, $\Delta\chi^2(7) = 8.24, p = .31$); therefore, the equality constraint was retained in the model. In examination of the child negativity stability paths, constraining all four paths to be equal did not significantly decrease model fit ($\chi^2(84) = 162.09, p < .001$, RMSEA = .074, CFI = .515, $\Delta\chi^2(7) = 8.53, p = .28$) and the constraint was retained in the model. Finally, to determine whether the autoregressive paths differed by level of anger/frustration two model comparison tests were conducted in the multimodel procedure. First, the child negativity autoregressive paths were set to equality but did not vary by level of anger/frustration ($\chi^2(1) = 1.58, p = .21$). Then the maternal hostility autoregressive paths were set to equality and also did not vary by level of anger/frustration ($\chi^2(1) = .95, p = .33$). Therefore, the autoregressive paths were constrained to be equal across groups, resulting in a model with poor fit to the data ($\chi^2(84) = 162.09, p < .001$, RMSEA = .074, CFI = .515).

After establishing the autoregressive model, the synchronous paths, cross-lagged paths, and covariates were added to the model. This model demonstrated good fit to the data ($\chi^2(114) = 140.78, p = .05, \text{RMSEA} = .037, \text{CFI} = .968$). Further analyses indicated temporal invariance in the maternal hostility to child negativity cross-lagged paths for children who scored one standard deviation above the mean on difficult temperament ($\chi^2(117) = 142.08, p = .06, \text{RMSEA} = .035, \text{CFI} = .970, \Delta\chi^2(3) = 1.30, p = .73$). Temporal invariance was also found for the mother-to-child synchronous paths ($\Delta\chi^2(3) = 1.59, p = .66; \Delta\chi^2(3) = 2.36, p = .50$) and child-to-mother synchronous paths ($\Delta\chi^2(3) = 4.72, p = .19; \Delta\chi^2(3) = 2.57, p = .46$) for both one standard deviation below and above the mean, respectively (see Appendix A for a table of comparison tests).

Path estimates by group are shown in Figure 4. The model had good fit to the data, $\chi^2(129) = 153.32, p = .07, \text{RMSEA} = .033, \text{CFI} = .971$. Maternal race ($X\beta = -.86, p = .04$) and income ($X\beta = -.18, p < .001$) had significant associations with maternal hostility, whereas only maternal race ($X\beta = .59, p = .01$) was significantly related to child negativity. All other covariates were non-significant for both maternal hostility and child negativity.

A series of multigroup model comparison tests were then analyzed to determine whether path estimates between the two groups were significantly different thereby evidencing statistical moderation. As shown in Figure 4 and reported in Table 5, moderation was evident in 5 of 6 cross-lagged paths and 4 of 8 synchronous paths. The cross-lagged paths from 36 months to 54 months were not assessed for moderation as child temperament was assessed when children were 54 months. However, it should be noted that the maternal hostility to child negativity cross-lagged path from 36 to 54

months evidenced the same overall pattern as the three subsequent cross-lagged paths. Given the moderate level of stability in child temperament, it is likely differences in this path were attributable to temperament.

Overall, the analyses support moderation by anger and frustration with children scoring high on anger and frustration being significantly less likely to display negativity across time in response to maternal hostility, controlling for stability in child negativity and behavioral associations occurring in-the-moment. Temporal relations from maternal hostility to child negativity for dyads with children scoring low on anger and frustration were not supported suggesting either a lack of relation through time for this group or lags that are measured too far in the future. In addition to parent-to-child effects by anger/frustration, support was found for moderation of the child-to-parent effect from 54 months to first grade, and from third grade to fifth grade, controlling for stability in maternal hostility and behavioral associations occurring in-time. Specifically, at both lags, mothers of children scoring one standard deviation below the mean were less likely to elicit hostility through time, albeit the grade 3 to grade 5 was marginal despite being significantly different from the same lagged path among mothers of children scoring high on anger/frustration. Child-to-parent cross-lagged relations were not significant for dyads with children scoring high on temperamental anger and frustration after the first lag, which was not tested for moderation due to temporal precedence with regard to when temperament was assessed. Overall, this model provides support for parent-to-child effects for children scoring high on temperamental difficulty, with these children significantly less likely to display negativity at the next assessment. Moreover, child-to-parent effects were found only among children scoring low on temperamental difficulty,

and only at particular developmental epochs, with these children less likely to elicit maternal hostility at the subsequent interaction. Finally, although interpretation of the synchronous paths is not straightforward, a differential pattern emerged between children scoring low and high on difficulty. Mothers of children scoring low on difficulty demonstrated a significant positive within-time association (i.e., in-the-moment) whereas mothers of children scoring high on anger and frustration had a negative within-time association.

Moderation by Maternal Neuroticism

The final of goal of this study was to determine whether maternal neuroticism moderated the reciprocal relations between maternal hostility and child negativity from 36 months to fifth grade. Given the presence of moderation is most likely to appear at the extreme ends of a distribution, the optimal approach was to examine mothers with neuroticism scores one standard deviation above and below the group mean. Despite a near normal distribution, the estimated hybrid model would not converge. Multiple approaches were taken to attempt model convergence such as utilization of several sets of parameter starting values, estimating a more parsimonious model, and removing the covariates; however, these attempts did not lead to model convergence. As a result, a less stringent approach was taken to compare the highest 15% of mothers and the lowest 50% of mothers. As with the standard deviation approach this model would not converge. Removing the covariates from the model allowed convergence and model building, nevertheless, when the covariates were added back into the model convergence failed. Although this model did not include the covariates, which precludes drawing conclusions or comparisons with the final model, the overall structure of the model did not diverge

significantly from the final model reported (e.g., significant paths were negative).

Therefore, given difficulties with model estimation, a mean split on neuroticism was investigated. This model resulted in available data for nearly the entire sample ($N = 1272$) with approximately 47% of mothers scoring above the mean on neuroticism.

As aforementioned, a two-step procedure was used to assess moderation by neuroticism. Specifically, independent group models were simultaneously modeled using the multimodel function in *Mplus*. Subsequent to determining the model structure, the multigroup structural equation model approach was used to assess moderation in the patterns of mother-child relations among mothers who scored above and below the mean on neuroticism.

To determine whether the autoregressive path from 36 months to 54 months for both maternal hostility and child negativity should be freely estimated or constrained to the other autoregressive paths, respectively, two model comparison tests were conducted. First the autoregressive model outlined above was run ($\chi^2 (107) = 192.96, p < .001$, RMSEA = .036, CFI = .976). The autoregressive path for maternal hostility from 36- to 54 months was then constrained to be equal to the path from 54 months to grade 1 ($\chi^2 (109) = 195.24, p < .001$, RMSEA = .035, CFI = .976), and did not significantly decrease model fit ($\Delta\chi^2 (2) = 2.28, p = .32$). Similarly, constraining the autoregressive child negativity path from 36 to 54 months to the autoregressive path from 54 months to first grade did not significantly decrease model fit ($\chi^2 (111) = 195.91, p < .001$, RMSEA = .035, CFI = .976, $\Delta\chi^2 (2) = .67, p = .72$). Therefore, both autoregressive paths were constrained to be equal to their respective autoregressive paths. Next, to determine whether the maternal hostility autoregressive paths differed by level of neuroticism a

model comparison test was conducted. The time-sequential autoregressive paths did not vary by level of neuroticism ($\chi^2 (1) = .44, p = .51$), nor did the additional longer timed autoregressive paths ($\chi^2 (1) = 3.60, p = .06$); therefore, both models were constrained to have the same maternal hostility autoregressive constraints. Finally, a model comparison test was conducted to determine whether the autoregressive child negativity paths differed by mothers' level of neuroticism. The child negativity autoregressive paths did not significantly vary between groups ($\chi^2 (1) = 3.09, p = .08$) and were therefore constrained to be equal across groups. Path estimates by group are shown in Figure 5. The model had good fit to the data, $\chi^2 (111) = 195.91, p < .001$, RMSEA = .035, CFI = .976. Maternal education ($X\beta = -.10, p < .01$) and income ($X\beta = -.03, p = .03$) had significant associations with maternal hostility, whereas only maternal age ($X\beta = .04, p = .02$) was significantly related to child negativity. All other covariates were non-significant for both maternal hostility and child negativity.

Within the multimodel procedure, a series of model comparison tests were conducted to determine whether paths estimates varied by maternal neuroticism (i.e., multigroup test), thus evidencing the presence of statistical moderation. Individual path tests are reported in Table 6. Moderation was found in 3 of 8 cross-lagged paths and 2 of 8 synchronous paths. In response to child negativity, mothers who scored below the mean on neuroticism evidenced an increase in the probability of exhibiting hostility from 36 months to 54 months, controlling for stability in hostility. In contrast, mothers scoring above the mean on neuroticism were significantly less likely to display hostility from 36 to 54 months and from 54 months to first grade relative to mothers scoring lower on neuroticism. This effect attenuated after the first two lags. Interestingly, the pattern of the

child-to-parent effect for mothers scoring below the mean on neuroticism shifted across time such that from 36 to 54 months these mothers were more likely to display hostility, after accounting for stability in hostility, but by the grade three to grade 5 lag they showed a decrease in the probability of exhibiting hostility. However, it should be noted that although the child-to-parent lag from grade 3 to grade 5 was significant for mothers scoring below the mean and not significant for mothers scoring above the mean, evidence of moderation was not statistically supported ($\chi^2(1) = 2.19, p = .14$). Together evidence for moderation in the child-to-parent cross-lagged paths was found early in the developmental course.

Moderation was also supported in the parent-to-child temporal relation from 36 to 54 months. Children of mothers who scored below the mean on neuroticism showed a significant decrease in the probability of displaying future negativity, controlling for stability in child negativity. This cross-lagged path was not significant for children of mothers with scores above the mean on neuroticism. Interestingly, by the grade 1 to grade 3 lag, children of mothers with higher neuroticism scores were less likely to demonstrate negativity in response to maternal hostility though this was not significantly different from children of mothers who scored low on neuroticism. This relation was no longer significant from third to fifth grade for both groups. The overall pattern suggests that despite early differences in children's responses to hostility by mothers' level of neuroticism, overtime the pattern becomes more similar. Moreover, the attenuation of the relation for both groups from third to fifth grade may be indicative of a developmental shift in early adolescence, though certainly further analyses are needed.

Finally, in examination of the synchronous paths, moderation by maternal neuroticism was supported at 54 months for both mother and child effects. The interpretation of synchronous effects is not straightforward; however, the data support a difference in the direction of synchronous effects for mothers scoring low and high on neuroticism. The mother-to-child effect was significantly positive for mothers scoring below the mean and non-significantly negative for mothers scoring above the mean. Moreover, the child-to-parent effect was significantly positive for mothers scoring above the mean and non-significantly negative for mothers scoring below the mean. Together, this may suggest children of less neurotic mothers respond more negatively to hostility presented in-the-moment, and more neurotic mothers respond with more hostility to child negativity in-the-moment. However, care must be taken when interpreting these effects as the synchronous paths do not represent purely transactional relations occurring in-the-moment.

Discussion

Parent-child relational dynamics have long interested developmental scholars. Theory and empirical research have increasingly focused on comprehending the processes through which these dynamics are formed and sustained over time. In particular, transactional models have furthered conceptualizations of parent-child interactions through examining relationships as reciprocal and transactional (Bell, 1968; Belsky, 1984; Bronfenbrenner & Evans, 2000; Sameroff, 2009; Sameroff & Chandler, 1975). Despite recognizing the bidirectional influences of parents' and children's behaviors on shaping the quality and valence of their dyadic interactions and each other's subsequent behaviors, few studies have examined aspects of parent and child behavior as

they occurred in-the-moment and facilitated the future quality of the parent-child relationship. Instead, most studies have examined parenting and children's behaviors in separate contexts, and often different periods of development. Although this research adds value to understanding longitudinal influences of parenting on children's development, it fails to provide insight into the formation of the intricate links in parent and child behavior across development. Therefore, the current investigation sought to advance the understanding of the intricate processes through which moment-to-moment parent-child interactions contribute to the formation of parent-child relational quality across development. Moreover, the present study considered individual characteristics that influence these processes of parent-child interactions and ultimately have consequences for optimal parenting and child development.

Sample and Measurement Considerations

Prior to discussing specific outcomes from the present study, a deeper consideration of the sample and measurement paradigm is warranted. First, the current sample consisted of primarily well-educated and well-resourced families. Accordingly, these families had few demographic risks. Furthermore, this was a non-clinical, behaviorally low-risk sample. In addition to a lack of clinical risk, the mothers and children had relatively low levels of normative-range dispositional risks. Specifically, neuroticism was low and relatively few children scored high on temperamental anger and frustration. Considered together, this sample was very low-risk and exhibited behavioral dispositions well within the normal range on non-clinical indicators.

The measurement paradigm utilized in the current investigation represented low-stress problem-solving and play interaction tasks. The procedures and tasks were not

designed to provoke maternal hostility nor child negativity, and as reported in the results, most often did not lead to the elicitation of even low levels of negative behavior on the part of mothers or children. On 7-point scales, the means of negativity ranged from 1.21 to 1.78, and means for maternal hostility ranged from 1.23 to 1.53 from 36 months to fifth grade. Contextualizing the sample and measurement paradigm is critical for conceptualizing the findings in the present study. Overall, this sample was low-risk and evidenced infrequent occurrence of mild negative behavior during interactions. Coupled with understandings that negative behaviors decrease across development (Bradley, Pennar, & Iida, 2015), the probability of a decrease in hostility and negativity across childhood, should have, in hindsight, been foreseeable.

Reciprocal Mother-Child Relations Across Early to Middle Childhood

The current study utilized hybrid cross-lagged panel modeling to examine reciprocal relations in maternal hostility and child negativity across early to middle childhood, accounting for continuity in individual behavior over time and behavior that occurred in-the-moment during mother-child interactions. Maternal hostility was related to a significant decrease in children's use of negative behaviors during problem-solving and play interaction tasks approximately two years later. Moreover, child negativity at a given assessment was related to a decrease in the probability mothers would display hostility during interaction tasks measured approximately two years later. These findings were consistent with a transactional model of development whereby maternal and child behaviors simultaneously influence the parent-child relationship (Sameroff, 1975); however, the direction of these effects were contrary to the a priori hypotheses largely drawn from coercion theory and the aggression literature. Rather than escalating future

negative mother-child interactions, low-level negative behavior on the part of both mothers and children was related to a decrease in the probability of future negative behaviors by mothers and children. Although these findings diverged from the offered hypotheses they were not inconsistent with broader understandings of human behavior (Laricchiuta & Petrosini, 2014), and approach and withdrawal motivation theory and research (e.g., Elliott, 1999; Elliott & Covington, 2001).

Elliott (1999) posited human behavior is motivated by two independent mechanisms that are dependent on the valence of actual or potential stimuli. Approach motivation is the orientation towards positive stimuli and behavior is instigated by positive events. Avoidance motivation represents behavior away from a negative event. Schneirla (1965) proposed both approach and avoidance motivation are adaptive processes. These suppositions are congruent with Skinner's (1938) work on conditioning whereby punishment decreases the likelihood of subsequent behavior. In this regard, the positive within-time associations (i.e., synchronous paths) for increasing negative behavior may be conceptualized as a punishment for negative behavior which then decreases the likelihood either mothers or children will display negative behaviors in the future (i.e., negative lagged paths). Moreover, consistent with Elliott's work (1999; Elliott & Covington, 2001; Elliott & Thrash, 2002), the negative lagged paths may also reflect a general proclivity for humans to avoid negative stimuli (actual or potential). It may be possible that low levels of annoyance are related to withdrawal tendencies whereas more overt and higher levels of hostility may be related to approach behaviors akin to anger (Sullivan, 2011). In this manner, more hostile relationships may develop into coercive patterns whereas less hostile relationships exhibit a decrease in negative

behaviors across development (e.g., withdrawal), a shifting dialectic that is likely optimal for the continued negotiation of the parent-child relationship.

Perhaps the most salient finding from this study with low-risk, low-stress interactions, was mild, low frequency negative behaviors were not detrimental to the parent-child relationship, conceptualized as a coercive pattern of interaction. To the extent that negative parent and child behaviors facilitate avoidance of negative behavior but not avoidance of relational interactions or conflict more broadly, mild, low frequency negative behaviors may be adaptive. For example, maternal decreases in hostility across time in response to child negativity may model adaptive social processes such that children learn to manage mildly perturbing behaviors through withdrawal or preemptive avoidance. Undoubtedly parents socialize their children's responses to negative behaviors just as they do to positive behaviors in order to establish social competence in conflictual situations (actual or potential; Bandura, 1973, 1977). However, if the child learns to cope with negative behaviors by decreasing the frequency and duration of interactions with the parent, and even peers, this could have negative consequences for the dyadic relationship and development long-term (e.g., Caughlin, Hardesty, & Middleton, 2012; Johnson, LaVoie, Spenceri, & Mahoney-Wernli, 2001). The current investigation does not allow direct conclusions to be made, and indicators of the overall quality and valence of the relationship independent of the moment-to-moment assessments of behavior would be needed; however, it does indicate mild negative behaviors may not be detrimental for dyadic interactions in the form of escalating, coercive patterns of interaction. It should be noted however, that although the probability of future negativity and hostility decrease among dyads showing any levels of these behaviors, dyads scoring zero (i.e., no hostility

or negativity) increase in their probability of future negative behaviors. This increase may be reflective of a shift towards the normal pattern of association within each dyad. The measurement paradigm offers a one-time picture of behavioral patterns assumed to be normal for the dyad; however, at any given assessment the behaviors recorded may not be reflective of the dyads normative quality of behavioral interactions. In this regard, there is likely to be a shift toward greater negativity at one time and then a decrease in negativity at the next assessment; essentially capturing regression to each dyads' mean over time.

Mother-to-child effects. Dix (1991) argued that parents' appraisals of children's behaviors and emotions, and parents' own goals, affect how much positive or negative emotion is activated during parent-child interactions. Accordingly, if mothers evaluate children's negative behavior as a result of task-oriented frustration, rather than a lack of compliance or attempts to block mothers' own goals, then child negativity is not likely to provoke maternal hostility. The context, goals, and perceptions of the behavior therefore become important factors in determining the valence of the interaction. Likewise, if children do not perceive mothers' hostility as goal blocking in the task then it may do little to induce negativity. Moreover, given experiencing negative emotions is common in parent-child interactions (Patterson, 1976, 1980), the mild, low frequency occurrences found in this study may be within normal range for the dyad and therefore less likely to be perceived as overtly negative. If parents and children do not perceive each other's behaviors as overtly negative or hostile then an increase in negative behavior would not be expected and instead may lead to less negative behavior over time. In this regard, low levels of negative parent and child behavior may not be maladaptive for the relationship.

Support for this supposition can be drawn from emotion research suggesting negative emotions may be adaptive for parenting when these emotions are not frequent or intense (e.g., Zahn-Waxler, Radke-Yarrow, & King, 1979).

Hastings and Grusec (1998) found focusing on relationship goals was associated with positive affective states in parent-child disagreement, whereas focusing on parent-centered goals was associated with negative affective states. The current study found that maternal hostility at time one was associated with a decrease in the probability the child would display negativity at time two, and child negativity at time one was related to a decrease in the probability mothers would exhibit hostility at time two. Moreover, these lagged paths also indicate mothers and children initially exhibiting no hostility or negativity, respectively, was related to an increase in the probability the other would display negative behaviors at the subsequent interaction. However, this increase toward greater negativity was minor, reflected in the overall mean of these behaviors across time, and may in fact represent regression toward the mean among the dyads. The slight upward shift among those exhibiting no negative behavior at one time and higher negative behavior at the subsequent assessment likely does not indicate a coercive exchange but rather movement toward low-level negative exchanges typical for the dyad. The negative cross-lagged paths coupled with low mean levels of negative hostility and negativity across early and middle childhood may indicate more cooperative, or relation oriented goals to parenting and the parent-child relationship, which may facilitate optimal socialization vis-à-vis modeling withdrawal from negative interactions rather than engagement in coercive interactions. In this regard, avoiding negative interactions may be adaptive until avoidance facilitates a deeper level of conflict avoidance which has been

associated with maladaptive outcomes (see Caughlin, Hardesty, & Middleton, 2012). In support of this, Rutter (1987) proposed withdrawing from negative exchanges may reduce involvement in negative interactions, reduce the likelihood of coercive exchanges, and protect self-esteem. It may be possible that avoiding negative interactions by decreasing one's own negative behavior is a protective factor for relationship quality, whereas engaging in greater hostility or negativity may pose a risk for relational vulnerability or dysfunction.

SDT provides theoretical support for the idea that challenging child behavior may undermine mothers' competence and relatedness needs (Deci & Ryan, 2002); however, results from this study suggest low levels of child negativity may not undermine mothers' sense of competence and to some extent may be expected in novel situations that are mildly challenging. In such instances mothers may recognize the child's need for help and therefore do not respond with hostility, but rather the absence of hostility through time. In this regard, mothers may be demonstrating competency in the parenting role through the realization that increased hostility in the moment does little to aid the situation, and as a result, do not continue to respond with hostility but rather with a decrease in hostility over time. It is also possible that in-the-moment mothers are reacting to children's negativity, whereas through time the change in maternal behavior may be reflective of attempts to prevent negative responses in children via a lack of hostility (Gardner et al., 1999). As aforementioned, if this is indeed the case, mothers' may be unintentionally reinforcing the natural human tendency to withdraw from actual or potential negative stimuli (Elliott & Covington, 2001), and may be socializing children to disengage rather than engage in negative interactions.

Child-to-mother effects. Parental acceptance-rejection theory (Rohner, 1986) posits the meaning children ascribe to harsh parenting behaviors impacts the development of future behavior and adjustment problems. If children do not interpret their mothers' behaviors as hostile or rejecting, then the observed hostility likely would not lead to feelings of rejection in the child, thereby helping to prevent the formation of a conflictual or coercive relationship. Low levels of hostility may do little to move the child toward negative behaviors, particularly if the relationship is simultaneously characterized by warmth and acceptance (Rohner, 1986). Low levels of hostility in the context of an overall warm and supportive relationships may be interpreted as mothers' attempts to aid children with the interaction tasks rather than as attempts to undermine the child's competence, esteem or goals (Deater-Deckard & Dodge, 1997; Lansford et al., 2010). Moreover, in otherwise supportive relationships, maternal hostility likely does not undermine children's autonomy or relatedness needs. Whereas connections between unsupportive parenting and dysfunction in the parent-child relationship have been found in the attachment literature (e.g., Rohner, Khaleque, & Cournoyer, 2012), the low intensity and frequency of hostility observed in the present study may not undermine children's needs for autonomy, relatedness and competence because, for most dyads, it was neither sustained nor overt. To the extent children interpret mothers' low levels of hostility as "mom being mom" or normative, but not an undermining of individual worth or quality of the relationship, then the response may be a shift away from negative behavior rather than toward it. Preliminary support can be drawn from Bradley and colleagues (2015) work investigating relations between maternal hostility and child negativity net of positive aspects of parenting including respect for autonomy. Across

middle childhood, there was a dialectical shift in the relation between hostility and negativity such that the association became weaker over time. The reciprocal negative relation between hostility and negativity found in the present study may well reflect the developmental shift found by Bradley and colleagues.

Deater-Deckard and Dodge (1997) proposed individuals' interpretations of behaviors as normal may lead to a different pattern of association relative to behaviors perceived as aberrant. Therefore, an alternative hypothesis for the decrease in child negativity over time could be habituation. That is, exhibitions of low level hostility may be habituated by the child and no longer move their system out of homeostasis resulting in a lack of escalation in negative behaviors through time. Furthermore, because a diminution in negative behaviors is likely across development (e.g., Bradley et al., 2015), the negative association may reflect both a lack of provocation and a simultaneous developmental decrease in negativity.

Patterns of association across development. Previous research suggested patterns of association may weaken over time for parent-to-child effects and may strengthen across development for child-to-parent effects (Hartup, 1978; Scarr & McCartney, 1983; Stice & Barrera, 1995). Changes in children's autonomy, time spent in direct interaction with parents, and increasing peer interactions are likely contributors to shifts in the strength of parent-child influences across development (e.g., Bornstein, 2015; Eccles, 1999). Conversely, the present study failed to find evidence to support a change in the strength of relations in parent-child interactions across development. Both the parent-to-child and child-to-parent cross-lagged paths were found to be time invariant from 36 months to fifth grade. The ability to detect shifts in the strength of associations

across time may be dependent on the timing of the study. For example, the current investigation examined shifts in early and middle childhood. It may be possible that shifts occurred from infancy to early childhood, or could be more evident in the transition to adolescence. Nevertheless, in this low-risk sample, low levels of negative behavior facilitated a consistent withdrawal in the form of reduced hostility and negativity.

Most studies examining reciprocal parent-child relations have found support for either a primary parent-to-child effect or child-to-parent effect (Burke et al., 2008; Shaffer et al., 2013; Wu et al., 2014). Fewer studies have demonstrated parent and child effects in the same model (e.g., Pearl et al., 2014). For example, Pardini et al. (2008) found parental physical punishment was related to children's conduct problems which was further related to parents' use of physical punishment. In support of reciprocal models, the present study found support for both mother and child effects, and failed to find differences in the size of the effects. Together, these findings support theoretical and empirical work that contends parents shape children's behaviors, and children shape parents' behaviors (Bronfenbrenner & Evans, 2000; Sameroff, 2009; Sameroff & Chandler, 1975), and that neither parents nor children have a stronger effect on the dyadic relationship (Pardini et al., 2008). However, it must be restated that this was a low risk sample, participating in low-stress interaction tasks. It is possible, and expected, that a different pattern of interaction could emerge in high risk contexts. Specifically, highly aversive behaviors and overt hostility are likely to elicit a coercive pattern of interaction (Patterson, 1982). Furthermore, this study examined only one set of mother and child behaviors. It is feasible that different behavioral pairings could have different patterns of association across development. In particular, different behaviors may do more to elicit a

reaction from either partner, may have a shift in the strength of relations across time, and may do more to move the relationship such that either the mother or the child has a primary effect. For example, Rubin and Burgess (2002) argued children's antisocial behaviors may have a greater effect on parents' use of harsh discipline than the effects of harsh discipline on children's negative behaviors. In this case, children's clinical behavior problems may have a stronger effect on relational processes than parenting behaviors. In contrast, normative, mild forms of negative behavior on the part of mothers and children seem to have the same influence on relational processes across early and middle childhood.

Stability in behaviors across development. In accord with several investigations, the present study found general support for stability in mothers' and children's behaviors across development (e.g., Lansford et al., 2011; Newland, Ciciolla, & Crnic, 2015; Wu et al., 2014). However, for both mothers and children there was an initial significant decrease in the rank-order stability of hostility and negativity from 36 to 54 months, respectively. This shift on the part of children may reflect a developmental shift toward gaining autonomy and individual assertion such that a change in behavior is more likely than earlier in development. The shift in maternal rank-order stability in hostility may reflect the overall decrease in maternal hostility across children's development (Bradley, Pennar, & Iida, 2015) with a marked shift occurring in early childhood and subsequent stability across middle childhood.

The Moderating Role of Individual Characteristics

The second aim of this study was to determine whether individual characteristics led to differentiated patterns of parent-child interactions across early and middle

childhood. The results provided support for different patterns of association by level of temperamental anger and frustration, and maternal neuroticism, respectively. The findings from the moderation analyses were generally consistent with the overall model and did not provide evidence of a coercive pattern of interaction. Although this was contrary to the hypotheses, the findings fit within the motivation literature, which suggests individuals are motivated to avoid actual and perceived negative stimuli and interactions. In this regard, to the extent that mild negative behaviors do not induce overt anger, it may lead children with higher levels of anger and frustration, and more neurotic mothers to withdraw from negative behaviors exhibited by the other individual. Findings from both moderation analyses provide support for this hypothesis.

Child temperamental anger and frustration. Belsky's differential susceptibility hypothesis (Belsky, 1997; Belsky & Pluess, 2009) and the broader temperamental literature (e.g., Mesman et al., 2009; Poehlmann et al., 2012) support conceptualizing temperamental anger and frustration as a risk factor for developing negative behavioral and social outcomes when children are in suboptimal environmental contexts. Therefore, it was hypothesized that these children would display an increase in negativity in response to maternal hostility across time and that there would be no parent-to-child effect among children scoring low on anger and frustration. These hypotheses were partially supported. Contrary to initial expectation, maternal hostility was related to less child negativity among children scoring high on anger and frustration. One plausible explanation is that children scoring high on anger and frustration were still within a normal range and did not represent clinical-levels of these behaviors. Moreover, the mild, infrequent hostility displayed by mothers likely did not represent a suboptimal

environment but rather an optimal environment. Even high quality, warm and supportive parents display hostility during interactions with their children (Dix, 1991). Based on the current findings, the normative levels of hostility observed may not be frequent or overt enough to induce an increase in child negative behavior among children scoring high on anger and frustration. Furthermore, it may be that children high on anger and frustration were more negatively aroused at time one due to an unknown cause (e.g., child did not have a nap and is hungry), and at time two these children did not experience a provoking event prior to assessment. In this case, these children, predisposed to reacting with more anger and frustration, would have been more likely to exhibit negativity at time one and less likely to exhibit negativity at time two. Therefore, the movement may reflect normative variation in children's behavior; variation that is likely greater among children scoring high on anger and frustration relative to children scoring lower, leading to a larger decrease in probability of displaying negativity at the next assessment. Essentially, the proclivity to demonstrate greater anger and frustration may lead to greater variation in the negative behaviors of these children when they experience a provoking interaction or stimulus, and subsequently greater shifts in the regression toward their mean level of negativity.

The second hypothesis was supported. Children scoring low on anger and frustration did not display a significant change in negativity across time, net of their previous negative behavior and within-time associations between maternal and child behavior. This may reflect a more accurate measurement of their initial behavior and less variability in displays of negativity. Consequently, children scoring low on anger and frustration would be less likely to exhibit a shift in behavior relative to children scoring

high on anger and frustration. It is also possible the lag time for the low anger and frustration group was too long and therefore affects were attenuated. The time between lags to adequately capture relations of interest are not necessarily the same for all groups (Selig & Little, 2012).

Moderation was found in two of three child-to-parent lagged paths. Mothers of children with a lower proclivity for anger and frustration evidenced a significant decrease in the probability of displaying hostility at first and fifth grades. Although the path from first to third grade was negative, the path was not significant nor was the test for moderation. The first lagged path could not be tested for moderation due to temporal precedence; however, the path coefficients do provide meaningful information. Taken together, the child-to-parent effects among children scoring low on anger and frustration demonstrate a shift in associations with early negativity being marginally related to greater hostility from 54 months to first grade. Subsequently, the pattern shifted such that child negativity was associated with less future hostility, albeit the final lag was only marginally significant. In comparison, the first lagged path was significantly positive for dyads with children scoring high on anger and frustration. This association attenuated across development but remained positive. Whereas mothers of children with low levels of anger and frustration demonstrated not only a decline in hostility but a decreased likelihood of displaying hostility, mothers of children scoring high only evidenced a decline in hostility. Together this may suggest that mothers of less temperamentally angry children are more able to respond sensitively to children's negativity, and although mothers of more angry and frustrated children did not display an increase in the probability of exhibiting hostility, they did not evidence the same degree of decline.

Therefore, it may be more challenging to deescalate negative interactions with more challenging children compared to less challenging children across development.

Research has found children with higher negative emotionality elicit harsher parenting behaviors relative to easier children (e.g., Lengua & Kovacs, 2005; Wang, Deater-Deckard, & Bell, 2013). The findings from this study are somewhat consistent with these findings. Child negativity was not significantly related to maternal hostility among children scoring high on anger and frustration, though coefficients were positive. Rather, this association was negative among children scoring lower on anger and frustration. These findings support a general degree of harsher responses from mothers in the face of more anger and frustration, but not in the form of greater hostility but rather a lack of a decrease in hostility. It may be that mild negativity does not induce the same level of maternal hostility as do more overt forms of negativity displayed by children with higher temperamental risk. Nevertheless, these more challenging children do not seem to have the same benefit of decreased hostility across middle childhood. Another plausible explanation owes to the conceptualization of temperament in this study. The present investigation utilized only temperamental anger and frustration, whereas other studies examining difficult temperament have included components including fear, sadness, and distress (e.g., Calkins, 2002; Guerin, Gottfried, & Thomas, 1997). Differences in the effects of temperament on parent-child relations may be different when studied individually versus in the aggregate. Finally, the present study investigated an aspect of temperament as a moderator of parent-child relational processes. Most studies investigating difficult temperament, parenting and children's development have focused on parent or child behavior as the moderator (e.g., Bradley & Corwyn, 2008; Poehlmann

et al., 2012). Therefore, the results from this study may provide a different lens from which to consider the role of temperament in parent-child relationships. In the overall context of the current study, higher levels of child temperamental anger and frustration were not related to an increase in hostility and in fact decreased from 54 months to first grade; however, the same benefit of a negative association between negativity and hostility was not found for the high scoring children as it was among children scoring low on anger and frustration. In other words, the association between temperament and harsh parenting may not be as bleak for more temperamentally angry and frustrated children living in low-risk families.

Although the precise meaning of the synchronous paths is difficult to conceptualize, important differences were found in the moment-to-moment associations. In the moment, the child-to-parent synchronous path was time invariant and was moderated by child temperamental anger and frustration. Among dyads with children scoring low, the synchronous path was significantly positive; however, this same path was significantly negative among dyads with children scoring low on this characteristic. In the moment, mothers may utilize negative behaviors as a means of combating their children's negativity when children demonstrate low levels of anger and frustration. Frustration with tasks is less common among these children and may be associated with mothers' reactive approach to cope with less characteristic anger and frustration. It may also be possible that these mothers are more willing to push their children in more challenging situations. On the other hand, this synchronous path was significantly negative among dyads with children scoring high on temperamental anger and frustration. This association may perhaps evidence mothers' attempts to deescalate their children's

frustration in the moment, albeit an effect that is not carried through time. The mother-to-child synchronous associations provided some support that more challenging children respond more negatively to maternal hostility in-the-moment. It should be noted however that the synchronous path for children scoring high was marginally significant as were tests for moderation. These results may be reflective of differences in individuals' proclivities to utilize both reactive and preemptive behavioral strategies in response to negative behaviors (Gardner et al., 1999). Further research utilizing different analytical techniques are needed in order to confirm the suppositions offered regarding the synchronous paths, and care must be taken when forming conclusions based on these particular paths.

Stability in individuals' behaviors did not differ between low and high temperamental anger and frustration. That is, despite differences in children's proclivities to respond with anger and frustration, their rank order stability in negative behavior was the same. This does not indicate a lack of mean level differences in anger and frustration but rather behavioral change does not differ between the groups across early and middle childhood. Therefore, the overall pattern of behavior seems to remain the same for both groups across development. The same relation was evident in the stability of maternal behaviors. Mothers of both more and less angry and frustrated children were equally likely to maintain the rank order stability of their behaviors. These findings are consistent with broader notions of stability in mothers' and children's individual behaviors (Cairns et al., 1988; Coie & Dodge, 1983; Cummings et al., 1989; Eisenberg, 2012; Lansford et al., 2011; Newland, Ciciolla, & Crnic, 2015; Wu et al., 2014), and adds to the understanding that the stability of individual behavior does not seem to be dependent on

temperamental anger and frustration. Finally, the rank-order stability was consistent across time for both mother and child behaviors. Relative to the hybrid model with the entire sample, the model with only dyads with low and high scores on anger and frustration did not demonstrate an initial decline in rank-order stability. This finding may indicate that on more extreme levels of the moderator, there is more rank-order stability in individual behavior.

Overall, moderation by temperamental anger and frustration was supported in these analyses. Perhaps the most salient finding was that children with a greater disposition for anger and frustration were less likely to react to mothers' hostility with negativity across time. These children may be more likely to utilize avoidance strategies in response to negative maternal behavior as a protective or coping mechanism. Second, mothers of less angry and frustrated children are more readily able to decrease their hostile responses over time, perhaps owing to lower levels of overall negativity in their relationships. That is, mothers' abilities to avoid negative exchanges with their children may be easier if children are less likely to display anger and frustration.

Maternal neuroticism. Maternal neuroticism was investigated as a moderator of the associations between maternal hostility and child negativity across early and middle childhood. Researchers have hypothesized this individual characteristic may potentiate negative or coercive patterns of parent-child interactions (Belsky & Barends, 2002). In particular, the diathesis stress model purports individuals vary in their risk to environmental stressors and that personality can be a diathesis (Sigelman & Rider, 2015). In this regard, neuroticism was conceptualized as a risk for responding poorly under stressful circumstances. Findings support theory that parents' personalities influence both

parenting (Belsky, 1984) and children's development (Bronfenbrenner & Morris, 2006); however, contrary to expectation, maternal neuroticism was related to a decrease in the probability mothers would display hostility in response to child negativity across early childhood.

Although the results were not congruent with a diathesis stress model, the child-to-mother effects, at least during the first two lags, were consistent with motivation research. This research purports neuroticism represents a neurobiological sensitivity to actual or perceived stimuli, and that negative emotions are more likely to be elicited among these individuals. However, researchers argue, and physiological studies support, rather than posing a risk for greater negative approach behavior, neuroticism is related to withdrawal behaviors (e.g., Davidson et al., 1990; Elliott, 1999; Elliott & Covington, 2001; Elliott & Thrash, 2002). Therefore, the negative association between child negativity and maternal hostility among more neurotic mothers may represent mothers' inability to address children's negative behaviors, and instead withdrawal may serve to help these mothers to down-regulate. Essentially, in a low-risk context, the proclivity to withdraw from negative stimuli may serve as an adaptive mechanism to prevent the escalation of negative behavior. If this is true, it is perplexing as to why this association attenuates over time. By the grade one to grade three child-to-mother lag, the negative association was no longer significant among more neurotic mothers. It may be possible that overtime more neurotic mothers find it increasingly difficult to withdraw from children's negative behaviors, despite research demonstrating a decrease in children's mean levels of negative behavior across development. Overall, the results suggest moderation during early childhood but that the pattern of association is similar during

middle childhood. That is, at the final assessment, the association between child negativity and maternal hostility among less neurotic mothers mirrored patterns found earlier in development among more neurotic mothers, and was not significantly different despite the lagged effect being statistically significant for less neurotic mothers and nonsignificant for more neurotic mothers.

Bornstein and colleagues (2011) posited the facet of neuroticism that relates to individuals' concerns for others may be help to explain discrepant findings between studies that evidence negative relations between neuroticism and parenting (e.g., Belsky, Crnic, & Woodsworth, 1995; Clark, Kochanska, & Ready, 2000; Kochanska, Clark, & Goldman, 1997) and those that fail to find these same effects (e.g., Clarke, 2006; Smith et al., 2007; Turner, Beidel, Roberson-Nay, & Tervo, 2003). Within the context of the current study, the low-risk sample characteristics coupled with the low-stress of the measurement paradigm may have not represented environmental risk. Moreover, the low-level and frequency of child negativity observed may have been enough to elicit a stronger withdrawal response among more neurotic mothers, and capitalize on the facet of neuroticism that orients these individuals towards social others, without leading to the negative associations present in some studies or inducing outright anger which has been related to approach behaviors (Elliott & Thrash, 2002). That is, more high risk environments or behaviors may induce a negative association between neuroticism and poor parenting despite a concomitant concern for others (e.g., Kochanska et al., 2004; Losoya, Callor, Rowe, & Goldsmith, 1997; Metsapelto & Pulkkinen, 2003; Prinzie et al., 2004), whereas low risk social contexts and mild negative behavior may activate withdrawal and social concern leading to more adaptive maternal behavior.

The extant literature did not provide sufficient evidence as to whether or not moderation might be found in the mother-to-child lagged associations. It was feasible that children of more neurotic mothers would demonstrate less negativity in attempts to prevent a negative maternal reaction. It was also plausible that children of these mothers would demonstrate greater negativity as mothers have likely modeled poor behavioral responses to stressful interactions.

Moderation was supported only during the first parent-to-child lag from 36 to 54 months. Children of less neurotic mothers evidenced a decrease in the probability of exhibiting negative behaviors, whereas, this association was not significant among children of more neurotic mothers. By the next lag, children of more neurotic mothers were equally likely to show a decrease in negativity though this association was marginal from 54 months to first grade, and significant at the first to third grade lag. Both groups of children evidenced a nonsignificant negative association by the final lag. As with the child-to-mother lagged effects, the mother-to-child effects became more similar across development. The findings seem to be congruent with the overall supposition that humans are motivated to withdraw from negative stimuli, but that this may be more challenging for young children of neurotic mothers. Moreover, the lack of association for both groups at the end of middle childhood may be reflective of a coming shift in associations in early adolescence, though this is certainly speculative and warrants further investigation.

Prinzle and colleagues (2009) posited that neurotic parents may be more likely to negatively evaluate their children's negative behaviors. This was supported in the 54-month child-to-mother synchronous path such that more neurotic mothers evidenced a

significant positive association between child negativity and maternal hostility, and the relation was not significant for less neurotic mothers. However, the within time positive association was attenuated after 54 months, suggesting differences in maternal behavior in response to child negativity may occur earlier in child development.

The synchronous mother-to-child association at 54 months was also moderated by maternal neuroticism. At 54 months, children of less neurotic mothers evidenced an increase in the probability of displaying negativity compared to children of more neurotic mothers. Moderation was not supported beyond the 54-month assessment, and the pattern of influence was significantly positive for both groups at first and third grades, and nonsignificant at fifth grade. These findings may suggest that early in development, children of neurotic mothers are less willing to challenge negative maternal behavior and instead seek to deescalate negative interactions. Moreover, children of less neurotic mothers may be less concerned about an erratic response from their mothers compared to children of more neurotic mothers. However, such a conclusion is speculative, and if supported, it is unclear why the association shifts across development. As aforementioned, conclusions drawn from the synchronous effects must be cautioned.

Limitations and Future Directions

There are inherent limitations to the empirical research process; therefore, recognizing the limitations of the current study and offering useful directions for future research is critical to advancing the field. Although the current investigation utilized data from a large, multisite, longitudinal study, the sample does not generalize to the population. First, the mothers in the current sample had high educational attainment and high total family incomes. Second, despite efforts to include minority families, the

overwhelming majority were Caucasian, leading to the possibility that systematic cultural differences may not have been accounted for in the current analyses. Together, this led to few demographic risks and a fairly homogenous sample; therefore, the findings from this study are not easily generalized to the broader population. Future studies would benefit from examining processes of mother-child negative behavior in varying cultural and socioeconomic strata to further identify whether differences in these processes exist in the population.

In addition to sample limitations, there were limitations for the procedures and measures. Four of the five assessments were conducted in research laboratories across all 10 study sites. The third grade assessment was conducted in subjects' homes which may have introduced systematic differences in participants' behaviors during this mother-child observation relative to the other four assessments. Second, it is possible that conducting the observations in a laboratory had an effect on subjects' behaviors; however, the frequency with which participants visited the laboratories across the duration of the study, and the length of time in which they were at the laboratory during each visit likely reduced this possibility.

As regards limitations to the measures, child temperament was assessed when children were 54 months old. This precluded the researcher's ability to test for moderation in the 36 to 54 month lagged paths. Given the stability of temperament earlier in the life-course, future studies could consider assessing temperament earlier in development. Second, maternal hostility and child negativity were scored based on the combined frequency and intensity of these behaviors. Future studies may benefit from examining the frequency and intensity independently as these indicators may result in

functionally different processes. For example, high frequency but low intensity hostility may not relate to child negativity in the same fashion as low frequency, overtly hostile behaviors. Furthermore, the measurement paradigm was not intended to elicit or provoke negative mother-child exchanges. Therefore, the low-risk and low-occurrence of negative behaviors on the part of both mothers and children prohibited comparison of truly high- and low-risk groups, resulting in limitations in generalizability and non-normal distributions of the data. Additionally, it is feasible that patterns of association differ among more behaviorally at-risk mother-child dyads. Future studies should consider both comparing high- and low-risk samples, and utilization of measures geared towards examining how mothers and children engage during conflictual interactions, such as those used at the grades 3 and 5 assessments of the SECCYD but not used in the current study. This research would help to illuminate whether patterns of association differ among low- and high-risk samples, and whether mother and child behaviors are more likely to escalate overtime when observed in a paradigm designed to elicit or assess conflict, even among otherwise low-risk samples. Finally, hostility and negativity were measured only once during each assessment, and a global score was coded for each assessment. A one-time measurement cannot accurately measure normative dyadic behaviors at each time point and for all dyads. At each assessment there will be a group of dyads that either score below or above their true normative behavioral patterns. Future studies would benefit from measuring parents' and children's behaviors during interactions several times at each wave of data collection in an effort to more accurately reflect the behaviors of each dyad. In this manner, the researcher would be able to take an

average or summed score across each measurement to more accurately reflect the behavioral interactions of each dyad at each time point.

There are also a number of analytical limitations to acknowledge. First, the dichotomous rescaling limited the interpretation of the data in two ways: a) probit regression was used and is more difficult to interpret than linear regression, and b) the full range of the variables could not be considered in the model, limiting interpretation to any or no hostility and negativity, respectively. It is possible differences in the full spectrum of these behaviors existed. However, given the distribution of the data, it was necessary to dichotomize these variables (see Finkel, 1995; MacCallum, Zhang, Preacher, & Rucker, 2002). Second, hybrid cross-lagged panel modeling is optimal for fully accounting for the effects of previous behavior and within time behavior on lagged associations; however, synchronous paths can be difficult to specify and interpretations of these paths are not straightforward. As noted earlier, this led to reservation in drawing conclusions regarding the conceptual significance of these paths. Nevertheless, overall findings from a cross-lagged model were consistent with the hybrid model, lending support for the relations reported. Future studies should consider transactionally coding interactions as this makes interpretation of the synchronous paths clearer. Third, hybrid cross-lagged panel models are not identified and require model constraints in order to achieve identification (Kessler & Greenberg, 1981). This increases the probability of model misspecification in an already complex model. Despite this limitation, care was taken to identify the autoregressive structure of the data to determine whether imposing such constraints were both conceptually and analytically appropriate. Finally, the time between the lags is an important consideration. The overall goal of the original SECCYD

study was not to examine cross-lagged associations between these specific behaviors, and although significant consideration was given to the timing of the study design, the time between the lags may not have been optimal for these particular behaviors. Lags that are too far apart can lead to an attenuation of effects, and lags that are too close can lead to conclusions that either there are no effects, or insufficient time has elapsed to detect effects (Selig & Little, 2012). Studies seeking to investigate patterns of association in parent-child behaviors across development should put considerable forethought into determining measurement lags.

Several additional conceptual and analytical recommendations for guiding future research are also offered. In addition to measuring enacted behavior, researchers could include measures of parents' and children's interpretation of the interactions, as well as measures of their orienting responses to the behaviors elicited during the interactions (i.e., approach vs. avoid). Such approaches would help shed light on why the patterns of association found in this study might be evident. For example, to what extent do mothers or children interpret the negative behaviors as hostile? It may be possible that individuals' cognitive evaluations of the valence of interactions has a bearing on future behavior. Furthermore, assessing mothers' and children's orienting responses would allow for testing the approach-withdrawal theory which was used to comprehend the findings from the present study. Second, studies could include indicators of the overall context in which negative mother and child behaviors occurred including, for example, concurrent maternal warmth or support for autonomy, and children's task persistence. Conceptualizing the overall context in which negative behaviors occurred may provide useful knowledge on the effects of negative emotions and behaviors on parent-child

relationships, particularly as to when they are adaptive or maladaptive for individual and relational functioning. Relatedly, it would also be advantageous to examine patterns of association between other mother and child behaviors (e.g., maternal warmth and child negativity). Connections between any two mother and child behaviors may differ in their relations within and across time, and in the direction of effects (e.g., mother-to-child effect). Building a greater understanding of the links between parent and child behaviors helps to inform processes through which parent-child relationships are formed and sustained across development. Third, patterns of association between father-child dyads should be investigated. It is possible that the pattern of effects across-development and on the relationship (i.e., primary father or child effects) could differ from models of mother-child dyads. Fourth, researchers have tended to investigate aversive behaviors from a clinical perspective. Focusing on the role of negative behaviors in processes of parent-child relationships among non-clinical samples would illuminate how such processes unfold in healthy relationships. Such research is warranted given all relationships exhibit some degree of negativity (Dix, 1991), and comprehending the point at which this becomes a risk would inform empirical and intervention research. Fifth, other potential moderating factors should be considered. The current study only investigated two such indicators. There are likely other mother and child characteristics or contextual circumstances that increase or decrease the process of mother-child behaviors investigated in this study (e.g. ethnicity, dyad gender constellation, social risk).

Finally, future research that employs varying analytical methodologies would provide further insight into processes of mother-child relationships, and may help to resolve discrepancies in theoretical expectations of the functional role of negative mother

and child behaviors in varying contexts (i.e., low versus high behavioral risk). For example, relative to dichotomous, observed variables, a significantly greater focus has been placed on examining panel models with latent constructs. Such approaches can ease the model estimation process and more is known as regards model limitations and strategies to overcome such limitations (see Little, 2013). Utilization of growth models, including latent class and multilevel growth models, could also provide clarification in the examined processes (see Curran, Obeidat, & Losardo, 2010 for non-technical overview). Granted these approaches cannot simultaneously account for the reciprocal relations in mothers' and children's behaviors, they can however, provide support for individual growth trajectories. Latent class growth analysis or growth mixture models may be particularly useful when considering the function of moderating variables (Jung & Wickrama, 2008). Multilevel models are particularly useful for investigating nested data, including mother-child interaction data (e.g., Snijders & Bosker, 2012). Research by Bradley and colleagues (2015), for example, provides support for a decrease in the strength of relations between maternal hostility and child negativity across middle childhood. It would be possible to reverse the predictor and outcome variables to assess whether a similar decreasing relation was found. Together, such an approach could support the reciprocal findings reported in this study.

Conclusion

This study provides empirical support for conceptualizing parent-child relationships as reciprocal. In the overall model, maternal hostility was related to a decrease in the probability children would exhibit negativity two years later, which was further related to a decrease in the probability mothers would display future hostility.

Findings from this study help to further the understanding of individual behavior on the processes of parent-child relationships in the normal population. Perhaps the most salient finding is that low intensity, infrequent negative behaviors on the part of both mothers and children do not beget further negativity. These findings support a general proclivity in humans to avoid negative stimuli, and that low intensity negative behaviors and exchanges likely do not elicit the initiation of a coercive process. Mothers and children seem to be engaging in an adaptive coping process when confronted with mildly perturbing negative behaviors by the other individual. This process was evident across time and by both mothers and children.

The moderation analyses built on theoretical models of the importance of individual characteristics on parenting and development by empirically investigating whether associations in maternal hostility and child negativity across early and middle childhood differed by child temperamental anger and frustration, and maternal neuroticism. In both analyses, support was found for moderating effects, albeit the effects of child temperament were more pervasive and consistent across development than were the effects of maternal neuroticism. Children scoring higher on temperamental anger and frustration evidenced a greater likelihood of decreasing negative behavior across time relative to children scoring lower on this dispositional trait. Congruent with the moderation by temperament analyses, neurotic mothers also had a greater likelihood of decreasing hostility relative to less neurotic mothers, granted this association was found only in early childhood. Consistent with the motivation literature, both children with higher temperamental anger and frustration scores and more neurotic mothers seem to be utilizing a withdrawal approach to avoid negative mother-child interactions. The findings

from the present study support theory and offer new insight into the functional influence of negative parent and child behaviors on the formation of the parent-child relationship across early to middle childhood in a normative sample. Rather than developing coercive patterns of interaction, the dyads in this study demonstrated a more resilient low-conflict orientation toward managing the negative behaviors of their mothers and children, respectively.

Table 1

Descriptive Statistics

	<i>N</i>	<i>Percent</i>
Maternal hostility		
36 mo.	1161	25.2
54 mo.	1040	27.0
Grade 1	1004	33.8
Grade 3	987	29.4
Grade 5	937	17.8
Child negativity		
36 mo.	1161	37.5
54 mo.	1040	43.7
Grade 1	1004	41.1
Grade 3	987	21.7
Grade 5	937	16.3
Child anger and frustration	351	49.6
Maternal neuroticism	1272	46.9

Note. Percent of individuals who scored a one (e.g., demonstrated hostility during task).

Table 2

Bivariate Correlations for Study Variables

	1	2	3	4	5	6	7	8	9	10
Maternal hostility										
1 36 mo.	--	.25**	.27**	.16**	.21**	.30**	.01	.11**	-.00	.02
2 54 mo.		--	.26**	.25**	.15**	.14**	.25**	.09**	.07*	.03
3 Grade 1			--	.19**	.18**	.12**	.08*	.25**	.07 ⁺	.02
4 Grade 3				--	.21**	.09**	.04	.07*	.32**	.07*
5 Grade 5					--	.12**	.02	.11**	.07*	.23**
Child negativity										
6 36 mo.							.18**	.12**	.01	-.02
7 54 mo.							--	.15**	.06 ⁺	.10**
8 Grade 1								--	.06 ⁺	.19**
9 Grade 3									--	.19**
10 Grade 5										--
Neuroticism	.10**	.10**	.09**	.07*	.06 ⁺					
Anger/Frustration						--	.09**	.07*	.08*	.08*

Note. Correlation between child negativity and temperamental anger and frustration at 36 months was not calculated as temperament was assessed when children were 54 months.

⁺ $p < .10$. * $p < .05$. ** $p < .01$.

Table 3

Bivariate Correlations for Maternal Hostility and Child Negativity by Temperamental Anger and Frustration

		1	2	3	4	5	6	7	8
Maternal hostility									
1	54 mo.	--	.27**	.28**	.04	.18*	.06	.06	-.04
2	Grade 1	.24**	--	.18*	.17*	.07	.29**	-.00	.02
3	Grade 3	.18*	.22**	--	.23**	.11	.00	.21**	-.06
4	Grade 5	.15 ⁺	.15 ⁺	.22**	--	.03	.18*	.13	.29**
Child negativity									
5	54 mo.	.20*	-.03	.04	.06	--	.06	-.02	.15**
6	Grade 1	.10	.24**	.18*	-.00	.06	--	.05	.14 ⁺
7	Grade 3	.10	.14 ⁺	.42**	.10	.08	.06	--	.10
8	Grade 5	.08	.02	.24**	.33**	.10	.24**	.32**	--

Note. Correlation between difficultness and child negativity at 36 months was not calculated as temperament was assessed when children were 54 months. Above the diagonal are correlations when difficult temperament is one standard deviation above the mean. Below the diagonal are correlations when difficult temperament is one standard deviation below the mean. ⁺ $p < .10$. * $p < .05$. ** $p < .01$.

Table 4

Bivariate Correlations for Maternal Hostility and Child Negativity by Neuroticism

		1	2	3	4	5	6	7	8	9	10
Maternal hostility											
1	36 mo.	--	.23**	.26**	.16**	.28**	.30**	.06	.12*	-.09 ⁺	.06
2	54 mo.	.27**	--	.24**	.23**	.11*	.05	.32**	.10*	.07	-.00
3	Grade 1	.27**	.28**	--	.18**	.20**	.11*	.08 ⁺	.26**	.04	-.01
4	Grade 3	.16**	.25**	.19**	--	.29**	.07	.02	.05	.32**	.06
5	Grade 5	.12*	.18**	.16**	.13**	--	.14**	.02	.15**	.10 ⁺	.24**
Child negativity											
6	36 mo.	.30**	.22**	.12**	.12*	.10*	--	.19**	.11*	-.03	-.05
7	54 mo.	-.05	.18**	.08 ⁺	.06	.02	.17**	--	.11*	-.00	.03
8	Grade 1	.09*	.07 ⁺	.24**	.09*	.05	.13**	.18**	--	.08	.20**
9	Grade 3	.08 ⁺	.07	.09 ⁺	.32**	.05	.04	.12*	.04	--	.26**
10	Grade 5	-.02	.07	.05	.08 ⁺	.22**	.00	.17**	.18**	.12*	--

Note. Above the diagonal are correlations when neuroticism is above the mean. Below the diagonal are correlations when neuroticism is at or below the mean. ⁺ $p < .10$. * $p < .05$. ** $p < .01$.

Table 5

Path Comparison Tests for Moderation by Temperamental Anger and Frustration

Path	χ^2	df	p
Neg 54 to Hos G1	6.37	1	.01
Neg G1 to Hos G3	0.05	1	.83
Neg G3 to Hos G5	4.78	1	.03
Hos 54 to Neg G1	5.63	1	.02
Hos G1 to Neg G3	7.37	1	.03
Hos G3 to Neg G5	0.36	1	.01
Neg to Hos Synchronous	13.31	1	<.01
Hos to Neg Synchronous	3.43	1	.06

Note. The model test function in *Mplus* was utilized to calculate differences in path estimates. The overall model fit does not change when using the model test command ($\chi^2(129) = 153.32$, $p = .07$. RMSEA = .033. CFI = .971). The synchronous paths have only one test because the paths were constrained to be equal; therefore, one test is calculated for the set of paths rather than individual tests for each path.

Table 6

Path Comparison Tests for Moderation by Neuroticism

Path	χ^2	<i>df</i>	<i>p</i>
Neg 36 to Hos 54	19.00	1	<.01 ^a
Neg 54 to Hos G1	6.44	1	.01 ^a
Neg G1 to Hos G3	0.23	1	.64
Neg G3 to Hos G5	2.19	1	.14
Hos 36 to Neg 54	9.32	1	<.01 ^a
Hos 54 to Neg G1	1.13	1	.29
Hos G1 to Neg G3	0.23	1	.63
Hos G3 to Neg G5	0.36	1	.55
Neg 54 to Hos 54	8.04	1	.01 ^a
Neg G1 to Hos G1	0.43	1	.51
Neg G3 to Hos G3	0.16	1	.69
Neg G5 to Hos G5	1.47	1	.23
Hos 54 to Neg 54	9.36	1	<.01 ^a
Hos G1 to Neg G1	0.30	1	.59
Hos G3 to Neg G5	0.05	1	.83
Hos G5 to Neg G5	1.18	1	.28

Note. The model test function in *Mplus* was utilized to calculate differences in path estimates. The overall model fit does not change when using the model test command ($\chi^2(111) = 195.91$, $p < .001$. RMSEA = .035. CFI = .976).

^aModeration between groups supported.

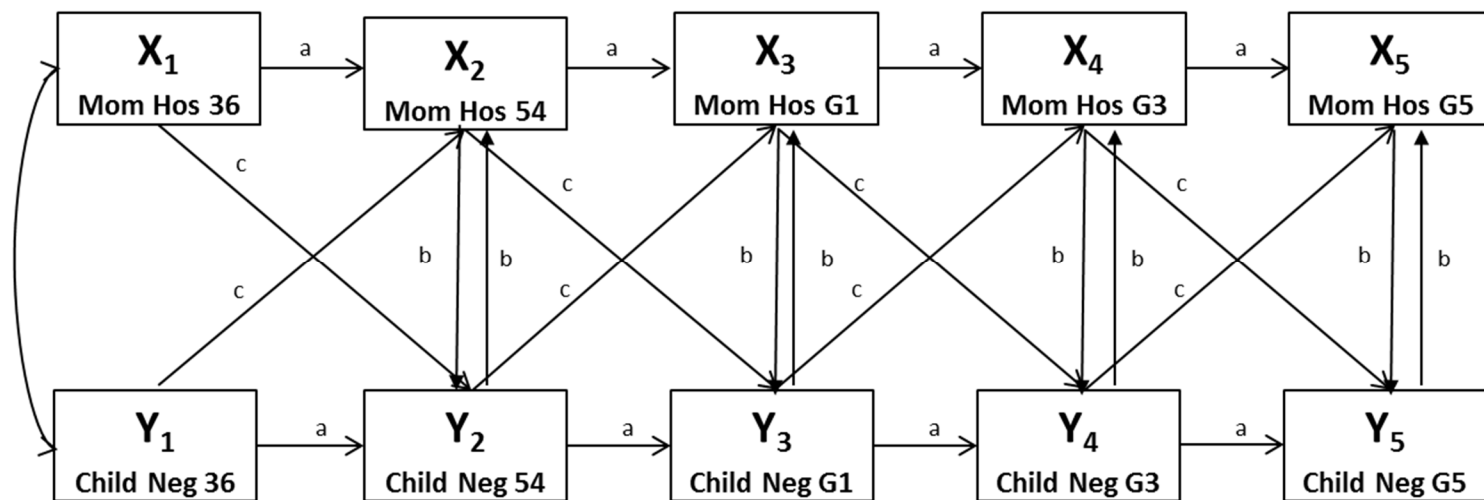


Figure 1. Conceptual hybrid cross-lagged panel model. Paths indicated by: (a) are autoregressive paths, (b) are synchronous paths, and (c) are cross-lagged paths.

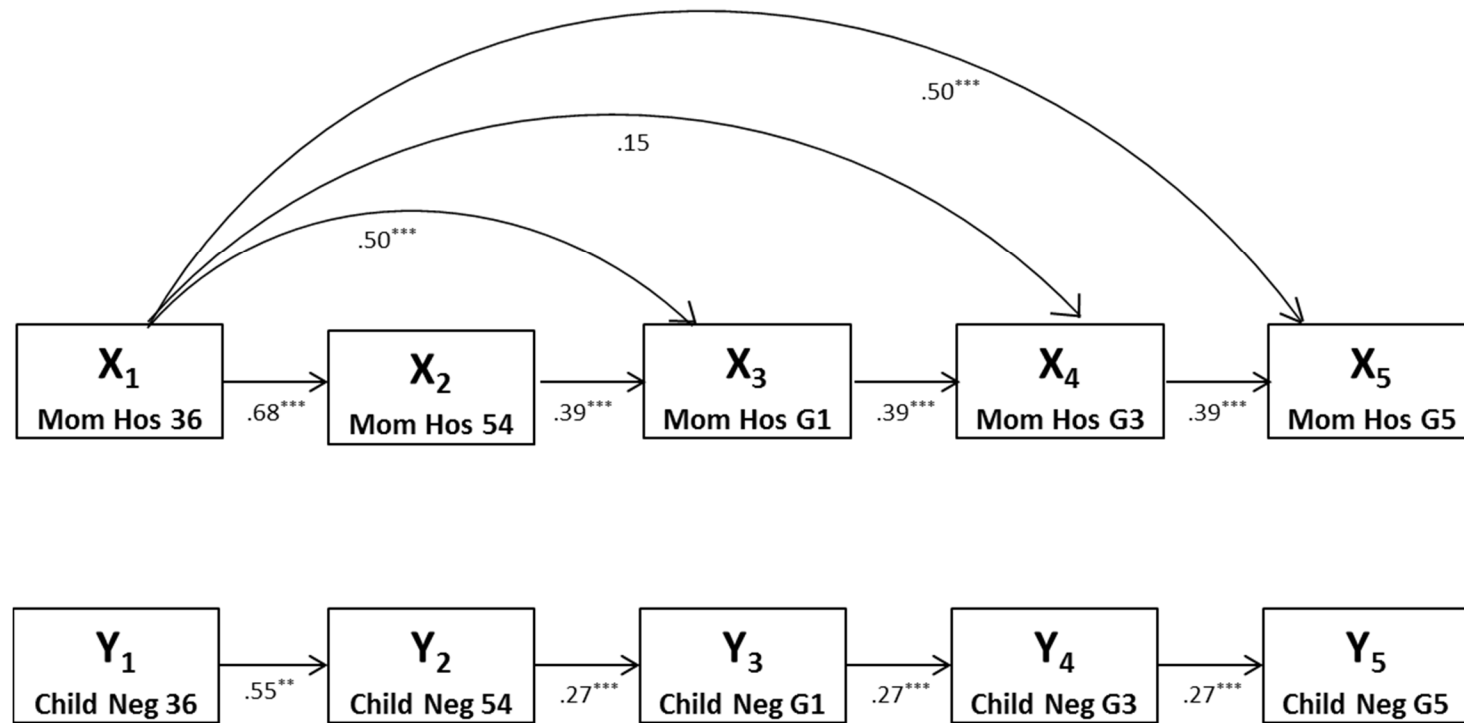


Figure 2. Autoregressive model. Estimates are probit regression coefficients. $\chi^2(37) = 349.07, p < .001$, RMSEA = .088, CFI = .515, $\Delta\chi^2(1) = .38, p = .54$. *** $p < .001$.

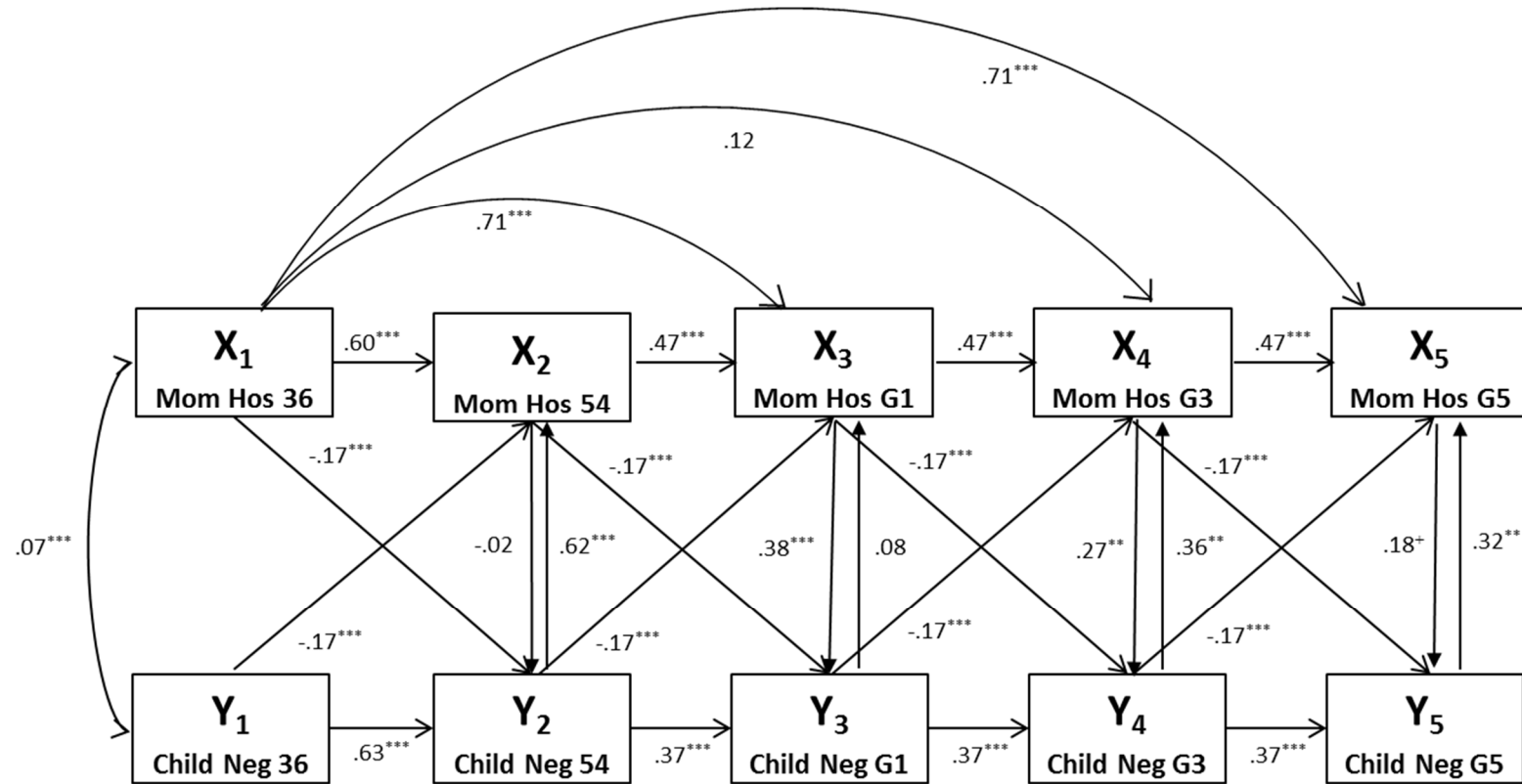


Figure 3. Hybrid cross-lagged panel model. Model controls for maternal age, education, income, ethnicity, and child sex. Estimates are probit regression coefficients. $\chi^2(59) = 151.44$, $p < .001$. RMSEA = .034. CFI = .982. ⁺ $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

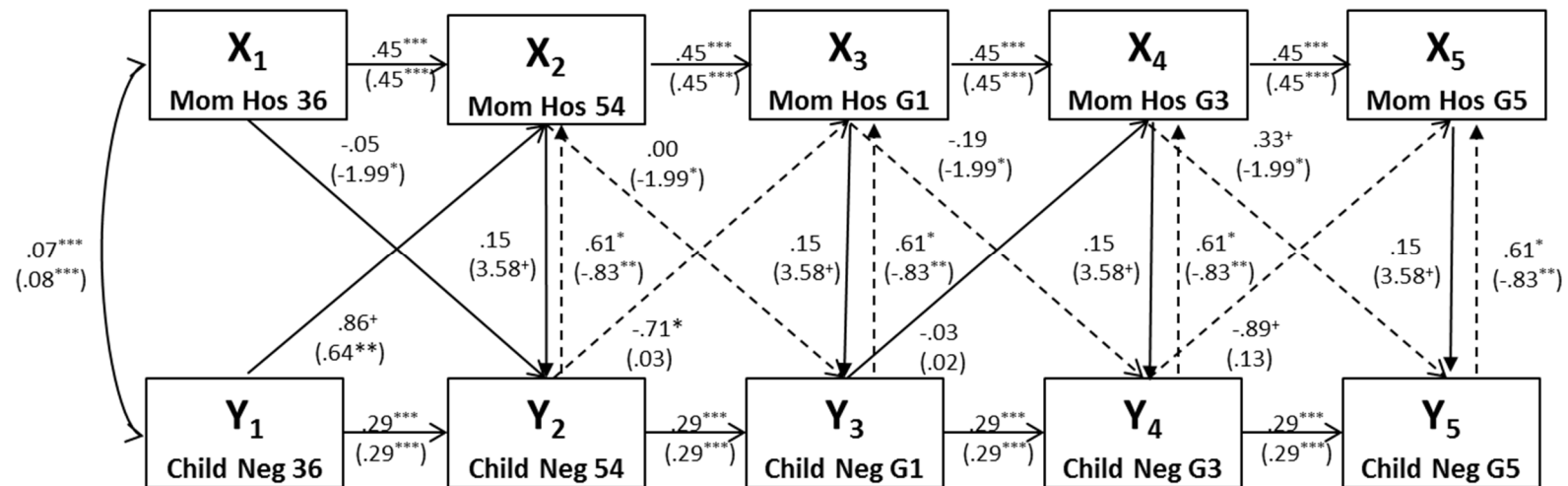


Figure 4. Hybrid cross-lagged panel model with moderation by temperamental anger and frustration. Model controls for maternal age, education, income, ethnicity, and child sex. Path estimates are probit regression coefficients. Path estimates for one standard deviation above the mean are presented in parentheses. $\chi^2(129) = 153.32$, $p = .07$. RMSEA = .033. CFI = .971. $^+p < .10$. $^*p < .05$. $^{**}p < .01$. $^{***}p < .001$. Dashed line indicates significant moderation at $p < .05$. Maternal hostility to child negativity synchronous evidenced moderation at the marginal level ($p = .06$).

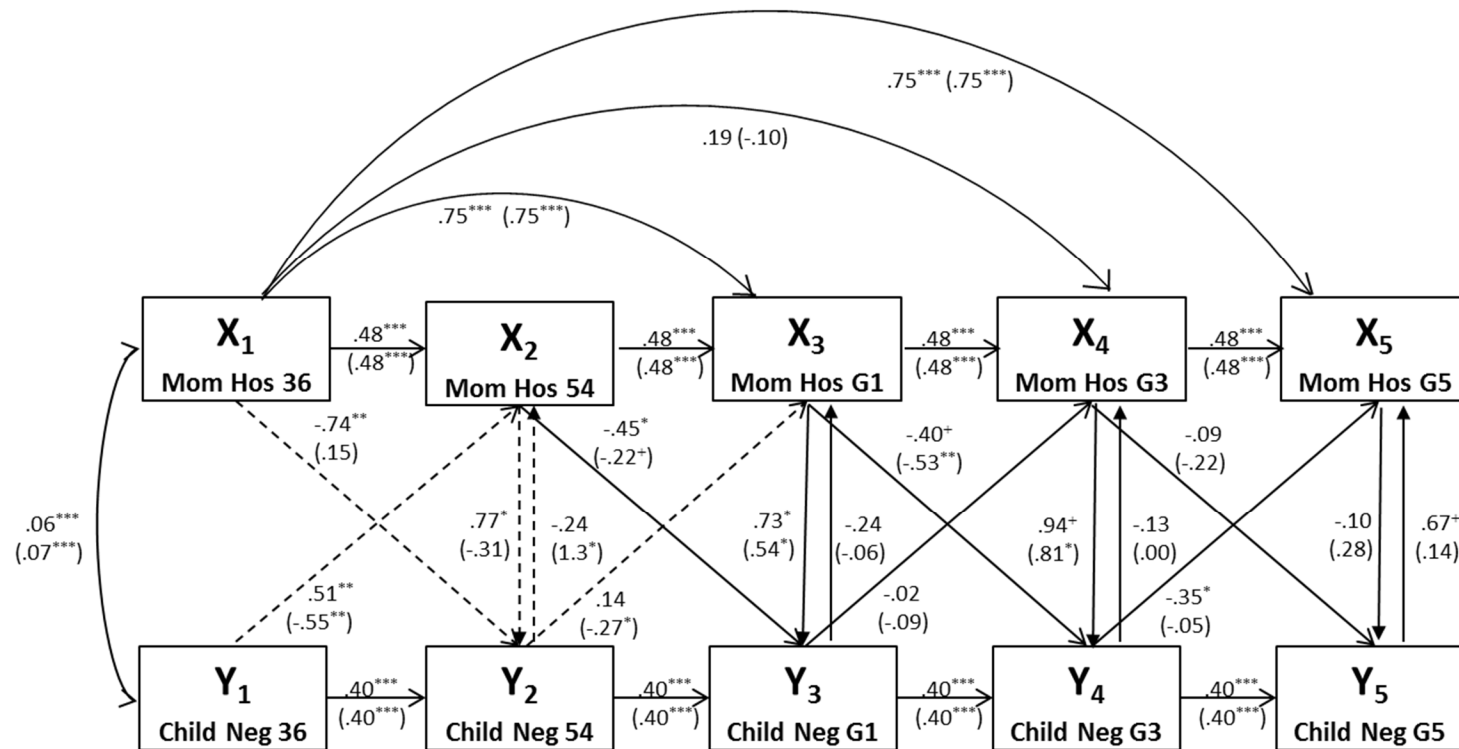


Figure 5. Hybrid cross-lagged panel model with moderation by neuroticism. Model controls for maternal age, education, income, ethnicity, and child sex. Path estimates are probit regression coefficients. Path estimates for mothers scoring above the mean on neuroticism are presented in parentheses. $\chi^2(111) = 195.91$, $p < .001$. RMSEA = .035. CFI = .976. + $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$. Dashed line indicates significant moderation at $p < .05$.

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APPENDIX A
MODEL FIT COMPARISON TESTS

TableA1

Autoregressive Model Comparison Tests

	Model	χ^2	<i>df</i>	RMSEA	CFI	$\Delta\chi^2$	Δdf	<i>p</i>	Comparison Model
I	Autoregressive (AR) model	383.77	35	.096	.458	--	--	--	
II	AR w/ 3+ stability paths	342.95	32	.095	.517	40.81	3	<.01 ^a	I
III	All hos AR paths equal	349.19	35	.091	.512	8.68	3	.03	II
IV	Last 3 hos AR paths equal	343.76	34	.092	.519	1.55	2	.46 ^a	II
V	All neg AR paths equal	354.15	37	.089	.507	13.91	3	<.01	IV
VI	Last 3 neg AR paths equal	347.47	36	.090	.516	5.14	2	.08 ^a	IV
VII	Additional AR paths equal	349.07	37	.088	.515	.38	1	.54 ^a	VI

Note. ^aConstraint retained in the model.

Table A2

Hybrid Model Comparison Tests for Lagged Effects

	Model	χ^2	<i>df</i>	RMSEA	CFI	$\Delta\chi^2$	Δdf	<i>p</i>	Comparison Model
I	Baseline (AR constraints)	145.04	52	.036	.982	--	--	--	
II	Mom-to-child lags constrained	151.05	55	.036	.982	7.17	3	.07	I
III	Child-to-mom lags constrained	151.42	58	.034	.982	1.65	3	.65	II
IV	Mom and child lags constrained	151.44	59	.034	.982	0.02	1	.89	III

Note. All constraints were retained in the model.

Table A3

Hybrid Multigroup Model Comparison Tests for Moderation by Anger and Frustration

	Model	χ^2	<i>df</i>	RMSEA	CFI	$\Delta\chi^2$	Δdf	<i>p</i>	Comparison Model
I	Baseline Model	140.78	114	.037	.968	--	--	--	
II	SDA hos to neg cross paths	142.08	117	.035	.970	1.30	3	.73	I
III	SDA hostility synchronous	144.44	120	.034	.971	2.36	3	.50	II
IV	SDB negativity synchronous	149.16	123	.035	.969	4.72	3	.19	III
V	SDB hostility synchronous	150.75	126	.033	.970	1.59	3	.66	IV
VI	SDA negativity synchronous	153.32	129	.033	.971	2.57	3	.46	V

Note. All constraints were retained in the model.